10-3930-237-20/985

TM 10-3930-237-20

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

ORGANIZATIONAL MAINTENANCE MANUAL

TRUCK, LIFT, FORK, GASOLINE
SOLID RUBBER TIRED WHEELS
2000-POUND CAPACITY
ARMY MODEL MHE-192
CLARK MODEL C20B-1632032-100
FSN 3930-781 3857
CLARK MODEL C20B-1632083-127
FSN 3930-781-3858

This copy is a reprint which includes current pages from Change 1.

HEADQUARTERS, DEPARTMENT OF THE ARMY

SEPTEMBER 1964

SAFETY PRECAUTIONS

Before Operation

When servicing battery, do not smoke or use flame in the vicinity. Batteries generate hydrogen, a highly explosive gas.

Check to be sure there is sufficient engine coolant and engine lubricant before starting the engine.

Do not fill fuel tank while engine is running. Provide metallic contact between the fuel container and fuel tank to prevent a static spark from igniting the fuel.

Always correct or report any faulty conditions that may result in further damage to the truck or cause injury to personnel.

Check the operating area to be sure it is clear of personnel and obstructions.

During Operation

Do not fill fuel tank while engine is running as fuel vapors may be ignited.

Do not remove the radiator cap from an overheated radiator; stop engine and allow radiator to cool before removing cap to avoid injury by scalding. Allow the engine to cool before filling the radiator, otherwise there is danger of cracking the cylinder head of block.

Do not operate the truck in a closed building without providing adequate ventilation as the exhaust contains carbon monoxide, a colorless, odorless, poisonous gas.

Do not work on the engine, while in operation, except for designated adjustments which must be made with the engine operating.

Do not shift directional shift lever while truck is in motion.

After Operation

Make sure forks are lowered to the ground when truck is parked and engage handbrake firmly.

If the truck is parked on an incline, block at least two wheels in the event of handbrake failure.

If engine cooling system or any lubricating oil sump is drained, make certain appropriate warning tags are attached to the steering handwheel.

Report or correct any faulty condition that may result in damage to the truck or cause injury to personnel if operation of the truck is continued.

CHANGE
NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *21 January 1985*

ORGANIZATIONAL MAINTENANCE MANUAL

TRUCK, LIFT, FORK, GASOLINE,

SOLID RUBBER TIRED WHEELS,

2000 POUND CAPACITY

CLARK MODEL C20B-1632032-100

ARMY MODEL MHE-192

(NSN 3930-00-781-3857)

CLARK MODEL C20B-1632033-127

(NSN 3930-00-781-3858)

TM 10-3930-237-20, September 1964, is changed as follows:

Title: Title appearing on front cover and page 1 changed as shown above.

Inside Front Cover: Add the following warnings:

WARNING

Operation of this equipment presents a noise hazard to personnel in the area. The noise level exceeds the allowable limits for unprotected personnel. Wear ear muffs or ear plugs which were fitted by a trained professional.

WARNING

Drycleaning solvent P-D-680 is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breath vapors. Do not use near open flame or excessive heat. The flash point is 100°F — 138°F (38°C — 59°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.

WARNING

Cooling system is pressurized. Remove cap slowly and only when engine is cool or painful burns could result.

WARNING

Compressed air, used for cleaning purposes will not exceed 30 psi (207 kPa). Wear face shield and protective clothing to prevent injury when using compressed air.

Page 1, Table of Contents, Chapter 3 Section II., change "Preventive Maintenance Services" to "Preventive Maintenance Checks and Services (PMCS)".

Page 9, Paragraph 10, line 1, change "Lubrication Order 10-3930-237-20" to "Lubrication Order, LO 10-3930-237-12".

Paragraph 11, change first sentence to read, "Refer to Lubrication Order, LO 10-3930-237-12".

Page 10, "Lubrication Order, LO 10-3930-237-20-1" is deleted.

Page 11, "Section II. PREVENTIVE MAINTENANCE SERVICES" is superseded by the following:

Section II. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

12. General

a. To make sure that your vehicle is ready for operation at all times, inspect it systematically so you can discover any defects and have them corrected before they result in serious damage or failure. The charts on the next few pages contain your organizational PMCS. The item numbers indicate the sequence of minimum inspection requirements. If you're operating the vehicle and notice something wrong which could damage the equipment if you continue operation, stop operation immediately.

Record all deficiencies and shortcomings, along with the corrective action taken, on DA Form 2404. The Item Number Column is the source for the numbers used on the TM Number Column on DA From 2404.

b. Organizational Preventive Maintenance Checks and Services

(1) The item numbers of the table indicate the sequence of the PMCS. Perform at the intervals shown below.

(a) Do your (A) PREVENTIVE MAINTENANCE quarterly (four times a year).

(b) Do your (H) PREVENTIVE MAINTENANCE at the hour interval listed.

(2) If something doesn't work, troubleshoot it according to the instructions in this manual or notify your supervisor.

(3) Always do your preventive maintenance in the same order so it gets to be a habit. Once you've had some practice, you will spot anything wrong in a hurry.

(4) If anything looks wrong and you can't fix it, write it down on your DA Form 2404. If you find something seriously wrong, report it to direct support as soon as possible.

WARNING

Drycleaning solvent, P-D-680, is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid allowing solvent to contact skin, eyes, and clothes, you don't breathe vapors. Do not use near open flame or excessive heat. If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If solvent comes in contact with skin or clothing, wash with water. If solvent gets in your eyes, flush eyes with water and get medical aid immediately. Flash point of solvent is 100°F — 138°F (38°C — 59°C).

(a) Keep it clean. Dirt, grease, oil and debris only get in the way and may cover up a serious problem. Clean as you work and as needed. Use drycleaning solvent (P-D-680) to clean metal surfaces. Use soap and water when you clean rubber or plastic material.

(b) Bolts, nuts and screws. Check that they are not loose, missing, bent or broken. You can't try them all with a tool, of course, but look for chipped paint, bare metal or rust around bolt heads. Tighten any bolt, nut, or screw that you find loose.

(c) Welds. Look for loose or chipped paint, rust or gaps where parts are welded together. If you find a bad weld, report it to direct support.

(d) Electric wires and connectors. Look for cracked or broken insulation, bare wires and loose or broken connectors. Tighten loose connections and make sure the wires are in good condition.

(e) Hoses and fluid lines. Look for wear, damage and leaks. Make sure clamps and fittings are tight. Wet spots show leaks, but a stain around a fitting or connector can also mean a leak. If leakage comes from a loose fitting or connector, tighten the fitting or connector. If something is broken or worn out, either correct it or report it to direct support.

(5) It is necessary for you to know how fluid leaks affect the status of your equipment. The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your equipment. Learn and be familiar with them and REMEMBER — when in doubt, notify your supervisor.

LEAKAGE DEFINITIONS FOR ORGANIZATIONAL PMCS

Class I — Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.

Class II — Leakage of fluid great enough to form drops, but not enough to cause drops to drip from the item being checked/inspected.

Class III — Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECK AND SERVICES

A—Annually H—Hours

Item No.	Interval A	Interval H	Item To Be Inspected Procedure: Check for and repair, fill or adjust as necessary.
			NOTE Perform Operator/Crew PMCS prior to or in conjunction with Organization PMCS if: a. There is a delay between the daily operation of the equipment and Organizational PMCS. b. Regular operator is not assisting/participating.
1			FUEL FILTER
		250	a. Clean bowl. Change the element and gasket.
		250	b. Check for leaks around the bowl gasket (ref: para 25).
2			ENGINE TUNE-UP
		250	a. Check condition of points. Check or replace and adjust to proper gap, .022 (ref: para 40).
		250	b. Check condition of individual spark plug and wires. Clean or replace; adjust to proper gap, .025 (ref: para 41).
		250	c. Check ignition timing. Perform all test procedures and adjustments (ref: para 16).
3			BELTS
		250	Check the belt deflection on the span between the fan pulley and the engine crankshaft drive pulley. Allow 3/4 to 1-inch deflection of the belt with firm thumb pressure (ref: para 35).
4			ACCELERATOR PEDAL AND LINKAGE
		250	Check accelerator rod slip tube to insure smooth operation (ref: para 29).

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECK AND SERVICES – CONTINUED

A—Annually H—Hours

Item No.	Interval A	Interval H	Item To Be Inspected Procedure: Check for and repair, fill or adjust as necessary.
5			BATTERY **WARNING** Do not smoke or allow any flame or spark in the vicinity while checking or filling the battery. The battery generates hydrogen, a highly explosive gas. **CAUTION** In cold weather operation, charge batteries immediately after adding water to combine the water with battery electrolyte to prevent freezing. Be carefule not to over-fill when servicing batteries.
		250	a. Test battery to determine cell condition. Recharge or replace battery as required (ref: TM 9-6140-200-14).
		250	b. Clean terminals and insure all connections are tight.
6			PARKING BRAKE
		500	Adjust as necessary. Brake lever requires 1-1/2 to 2 inches travel (ref: para 49).
7			BRAKE PEDAL AND LINKAGE
		500	Adjust brake pedal free play (between 3/16 and 5/16 inch) (ref: para 53).
8			RADIATOR **WARNING** Cooling system is pressurized. Remove cap slowly and only when engine is cool or painful burns could result.
	•		Check coolant for antifreeze and corrosion protection, and inspect cooling system for heavily rusted or partially clogged cooling system (ref: TB 750-651).

Page 29, after Paragraph 16. Testing, and before supparagraph *a*. insert the following:

WARNING

Compressed air, used for cleaning purposes will not exceed 30 psi (207 kPa). Wear face shield and protective clothing to prevent injury when using compressed air.

Page 30, Paragraph 17. delete "Cylinder Head".

Page 31, Paragraph 18, delete "Valve Adjustment".

Page 32, Figure 12. Engine oil filter, exploded view, leave in TM 10-3930-237-20.

Page 36, after Paragraph 26. Air Cleaner and before subparagraph *a.*, insert the following:

WARNING

Compressed air, used for cleaning purposes will not exceed 30 psi (207 kPa). Wear face shield and protective clothing to prevent injury when using compressed air.

WARNING

Drycleaning solvent P-D-680 is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breath vapors. Do not use near open flame or excessive heat. The flash point is 100°F — 138°F (38°C — 59°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.

Paragraph 26.*a.*(1) change "(fig. 34)" to "(fig. 39)".

Paragraph 26.*b.*(1) change "(fig. 34)" to "(fig. 39)".

Page 37, after paragraph 27. Fuel Tank Cleaning and before subparagraph *a.* insert the following:

WARNING

Compressed air, used for cleaning purposes will not exceed 30 psi (207 kPa). Wear face shield and protective clothing to prevent injury when using compressed air.

WARNING

Drycleaning solvent P-D-680 is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breath vapors. Do not use near open flame or excessive heat. The flash point is 100°F — 138°F (38°C — 59°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.

Page 51, Paragraph 43.*g.* after title insert the following:

WARNING

Drycleaning solvent P-D-680 is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breath vapors. Do not use near open flame or excessive heat. The flash point is 100°F — 138°F (38°C — 59°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.

Page 58, Paragraph 50.*a.* and *b.* are deleted.

Paragraph 50.*c.* and *d.* are changed to 50*a.* and *b.*

Page 61, Paragraph 55.*a.*(2) change (fig. 43) to read (fig. 48).

Page 62. Paragraph 56.*b.* after title, before (1) insert the following:

WARNING

Compressed air, used for cleaning purposes will not exceed 30 psi (207 kPa). Wear face shield and protective clothing to prevent injury when using compressed air.

WARNING

Drycleaning solvent P-D-680 is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breath vapors. Do not use near open flame or excessive heat. The flash point is 100°F — 138°F (38°C — 59°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid If contact with eyes is made, wash your eyes with water and get medical aid immediately.

Page 67, Paragraph 66.*b*. after title, before (1) insert the following:

WARNING

Compressed air, used for cleaning purposes will not exceed 30 psi (207 kPa). Wear face shield and protective clothing to prevent injury when using compressed air.

Page 72, APPENDIX I REFERENCES is superseded as follows:

APPENDIX I

REFERENCES

1. Army Regulations
   AR 310-25 Dictionary of United States Army Terms (Short Title AD)
   AR 310-50 Catalog of Abbreviations and Brevity Codes
   AR 600-55 Motor Vehicle Driver-Selection, Testing and Licensing

2. Department of the Army Pamphlets
   DA PAM 108-1 Index of Army Motion Pictures, and Related Audiovisual Aids
   DA PAM 310-1 Consolidated Index of Army Publications and Blank Forms
   DA PAM 738-750 The Army Maintenance Management System (TAMMS)

3. Field Manuals
   FM 21-30 Military Symbols (Reprinted with Basic Incl C1)
   FM 21-305 Manual for the Wheeled Vehicle Driver

Page 73, APPENDIX II MAINTENANCE ALLOCATION is superseded by the following:

APPENDIX II
MAINTENANCE ALLOCATION CHART
Section I. INTRODUCTION

2-1. General

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance categories.

b. The Maintenance Allocation Chart (MAC) in section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance function on the end item or component will be consistent with the capacities and capabilities of the designated maintenance categories.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

2-2. Maintenance Functions. Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).

b. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (including decontaminate, when required), preserve, drain, paint, or replenish fuel, lubricants, chemical fluids, or gases.

d. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Aline. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause correction to be made or to be adjusted on instruments or test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a space, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the third position of the SMR code.

i. Repair. The application of maintenance service[1], including fault location/troubleshooting[2], removal/installation, disassembly/assembly[3] procedures, and maintenance actions[4] to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publication (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipment/components.

2-3. Explanation of Columns in the MAC, Section II

a. Column 1, Group Number. Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly. End item group number shall be "00".

b. Column 2, Component/Assembly. Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Function. Column 3 lists the function to be performed on the item listed in Column 2. (For detailed explanation of these functions, see paragraph 2-2).

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a worktime figure in the appropriate subcolumns, the category of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the task within the listed maintenance function vary at different maintenance categories, appropriate worktime figures will be shown for each category. The worktime figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time, troubleshooting/fault location time, and quality assurance/quality control time in addition to the time required to perform a specific task identified for the maintenance functions authorized in the maintenance allocation

[1]Service — inspect, test, service, adjust, aline, calibrate, and/or replace.

[2]Fault location/troubleshooting — The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test (UUT).

[3]Disassembly/assembly — encompasses the step-by-step taking apart (or breakdown) of a spare/functional group coded item to the level of its least componency identified as maintenance significant (i.e., assigned an SMR code) for the category of maintenance under consideration.

[4]Action — welding, grinding, riveting, straightening, facing, remachining, and/or resurfacing.

chart. The symbol designations for the various maintenance categories are as follows:

C — Operator or Crew
O — Organizational Maintenance
F — Direct Support Maintenance
H — General Support Maintenance
D — Depot Maintenance

e. Column 5, Tools and Equipment. Column 5 specifies by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

f. Column 6, Remarks. This column shall, when applicable, contain a letter code, in alphabetical order, which shall be keyed to the remarks contained in Section IV.

2-4. Explanation of Columns in Tool and Test Equipment Requirements, Section III

a. Column 1, Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

b. Column 2, Maintenance Category. The lowest category of maintenance authorized to use the tool or test equipment.

c. Column 3, Nomenclature. Name or identification of the tool or test equipment.

d. Column 4, National Stock Number. The National stock number of the tool or test equipment.

e. Column 5, Tool Number. The manufacturer's part number.

2-5. Explanation of Columns in Remarks, Section IV

a. Column 1, Reference Code. The code recorded in column 6, Section II.

b. Column 2, Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

Section II. MAINTENANCE ALLOCATION CHART

(1) Group number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance category C	O	F	H	D	(5) Tools and eqpt	(6) Remarks
01	ENGINE								
0100	Engine Assembly	Inspect	0.3						
		Test		1.0					
		Service	0.4						
		Replace			8.0				
		Repair				12.0			
		Overhaul				28.0			
0101	Cylinder Block and Cylinder Head								
	Block Assembly, Short	Replace				8.0			
		Repair				12.0			
	Cylinder Head	Replace			2.5				
0102	Crankshaft								
	Crankshaft, Engine	Replace				12.0			
0103	Flywheel Assembly								
	Flywheel Engine	Replace			1.0				
		Repair			1.0				
0104	Pistons, Connecting Rods								
	Piston Ring Set	Replace				4.0			
		Repair				4.0			
	Pistons and Connecting Rods	Replace				4.0			
		Repair				4.0			

Section II. MAINTENANCE ALLOCATION CHART – CONTINUED

(1) Group number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance category C	O	F	H	D	(5) Tools and eqpt	(6) Remarks
01	ENGINE – CONTINUED								
0105	Valves, Camshafts, and Timing System								
	Valves, Engine, and Timing System	Adjust			1.0				
		Replace			5.5				
		Repair			2.0				
	Camshaft	Replace				8.0			
0106	Engine Lubrication System								
	Gage, Oil	Replace		0.1					
		Repair		0.2					
	Filter, Oil	Service		0.1					
		Replace		0.2					
0108	Manifolds								
	Manifold	Replace		1.0					
03	FUEL SYSTEM								
0301	Carburetor								
	Carburetor, Float	Adjust		0.5					
		Replace		1.0					
		Repair			2.0				
0302	Fuel Pumps								
	Pump, Fuel	Test		0.3					
		Replace		0.5					
0304	Air Cleaner	Service		0.2					
		Replace		0.5					
0306	Tanks, Lines, Fittings, Headers								
	Fuel, Tank	Service	0.1						
		Replace		0.4					
		Repair				1.5			
	Lines and Fittings	Inspect	0.1						
		Replace		0.5					
0308	Engine Speed Governor and Controls								
	Governor	Adjust		0.2					
		Replace			1.5				
		Repair			0.5				
0309	Fuel Filters								
	Filter, Fluid	Replace		0.3					
		Repair		0.3					
0312	Accelerator, Throttle or Choke Controls								
	Pedal and Linkage	Adjust		0.6					
		Replace		0.8					

Section II. MAINTENANCE ALLOCATION CHART – CONTINUED

(1) Group number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance category C	O	F	H	D	(5) Tools and eqpt	(6) Remarks
04	EXHAUST SYSTEM								
0401	Muffler and Pipes	Replace		1.0					
05	COOLING SYSTEM								
0501	Radiator, Evaporative Cooler or Heat Exchanger	Inspect	0.1						
		Service	0.2						
		Replace		1.0					
		Repair				2.0			
0503	Water Manifold, Headers, Thermostats and Housing Gasket								
	Thermostat	Test		0.5					
		Replace		0.5					
	Line Assembly	Inspect	0.1						
		Replace		0.4					
0504	Water Pump								
	Pump Assembly	Inspect	0.1						
		Replace		1.0					
0505	Fan Assembly								
	Blade, Fan	Replace		0.5					
	Belt	Inspect	0.1						
		Adjust		0.2					
		Replace		0.5					
06	ELECTRICAL SYSTEM								
0601	Generator, Alternator								
	Generator, Engine	Test		0.5					
		Replace		0.5					
		Repair			2.0				
0602	Generator Regulator								
	Regulator, Engine	Test		0.3					
		Adjust		0.3					
		Replace		0.3					
0603	Starting Motor								
	Starter, Engine	Test			0.5				
		Replace		0.6					
		Repair			1.5				
0605	Ignition Components								
	Spark Plug	Adjust		0.3					
		Replace		0.5					
	Distributor	Adjust		0.3					
		Replace		0.5					
0607	Instrument or Engine Control Panel								
	Instruments	Replace		1.0					

Section II. MAINTENANCE ALLOCATION CHART – CONTINUED

(1) Group number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance category C	O	F	H	D	(5) Tools and eqpt	(6) Remarks
06	ELECTRICAL SYSTEM – CONTINUED								
0608	Miscellaneous Items								
	Light Fuse and Switch	Replace		0.3					
0609	Lights								
	Headlight and Taillight	Replace		0.4					
0610	Sending Units and Warning Switches								
	Transmitter, Liquid	Replace		0.4					
0611	Horn, Siren								
	Horn, Horn Button and Relay	Test	0.1						
		Replace		0.5					
0612	Batteries, Storage								
	Battery Cables	Inspect	0.1						
		Replace		0.3					
	Battery	Test		0.1					
		Service		0.3					
		Replace		0.3					
07	TRANSMISSION								
0705	Transmission Shifting Components								
	Bracket Assembly	Replace			1.0				
		Repair			1.5				
0708	Torque Converter or Fluid Coupling	Replace			0.5				
0710	Transmission Assembly	Test			2.0				
		Service		0.5					
		Replace			8.0				
		Repair				12.0			
		Overhaul				16.0			
0714	Servo Unit								
	Valve Assembly	Replace			1.0				
		Repair			2.0				
	Housing Assembly, Control Valve	Replace			1.0				
		Repair			2.0				
0721	Coolers, Pumps, Motors								
	Valve Assembly	Replace				1.0			
	Hose Assembly	Replace		1.0					
		Repair			1.5				
	Filter, Fluid	Replace		0.2					
10	FRONT AXLE								
1000	Front Axle Assembly								
	Ring, Axle, Mounting	Replace			2.0				
	Adapter, Axle	Replace			2.0				
		Repair				3.0			

Section II. MAINTENANCE ALLOCATION CHART – CONTINUED

(1) Group number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance category C	O	F	H	D	(5) Tools and eqpt	(6) Remarks
10	FRONT AXLE – CONTINUED								
1000	Front Axle Assembly – Continued								
	Carrier, Bearing, Differential	Replace				2.0			
		Repair				3.0			
1002	Differential								
	Gear Set, Transmission	Replace				3.0			
		Repair				4.0			
	Pin, Side Pinion	Replace				3.0			
11	REAR AXLE								
1100	Rear Axle Assembly								
	Axle Assembly	Adjust			0.5				
		Replace			3.0				
		Repair			3.0				
1104	Steering, Sideshift and Wheel Leaning Mechanism								
	Steering Knuckles and Attaching Parts	Replace			2.0				
12	BRAKES								
1201	Hand Brakes								
	Lever, Manual Control and Parking Brake	Test	0.1						
		Adjust		0.1					
		Replace		0.7					
	Brake Assembly, Hand	Replace			1.0				
		Repair			0.8				
1202	Service Brakes								
	Brake Shoe	Replace			1.0				
	Arm Adjuster, Reaction	Replace			1.0				
1204	Hydraulic Brake System								
	Line Assembly	Replace		1.0					
		Repair			1.0				
	Cylinder Assembly, Master	Service		0.1					
		Replace		1.0					
		Repair			1.0				
	Cylinder Assembly, Hydraulic Brake Wheel	Replace		1.0					
1206	Mechanical Brake System								
	Clevis, Master Cylinder	Replace		0.3					
	Pedal Assembly and Linkage, Brake	Adjust		0.2					
		Replace		0.5					
		Repair			0.5				

Section II. MAINTENANCE ALLOCATION CHART – CONTINUED

(1) Group number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance category C	O	F	H	D	(5) Tools and eqpt	(6) Remarks
13	WHEELS AND TRACKS								
1311	Wheel Assembly								
	Wheel and Tire Assembly	Replace		0.7					
		Repair				1.0			
	Hub and Cup Assembly, Front	Replace		0.5					
		Repair		0.5					
	Hub Assembly, Steering Axle	Replace		0.5					
1313	Tires, Tubes, Tire Chains								
	Tire, Solid Rubber	Inspect	0.2						
		Replace				1.7			
14	STEERING								
1401	Mechanical Steering Gear Assembly								
	Gear Assembly, Steering	Service	0.3						
		Replace			4.0				
		Repair				2.0			
	Drag Link Assembly	Adjust		1.0					
		Replace		2.0					
	Tie Rod, Steering Axle	Service		0.4					
		Replace		2.0					
15	FRAME, TOWING ATTACHMENTS, DRAWBARS AND ARTI – CULATING SYSTEMS								
1501	Frame Assembly	Replace			4.0				
1502	Counterweights								
	Counterweight	Replace		0.7					
1503	Pintles and Towing Attachments								
	Towing Attachment	Replace		0.5					
18	BODY, CAB, HOOD AND HULL								
1801	Body, Cab, Hood and Hull Assemblies								
	Supports, Hood and Seat	Replace		1.0					
	Overhead Guide	Replace		0.7					
		Repair				1.0			
1805	Floors, Subfloors and Related Components								
	Plate Assembly, Floor	Replace		1.0					

Section II. MAINTENANCE ALLOCATION CHART – CONTINUED

(1) Group number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance category C	O	F	H	D	(5) Tools and eqpt	(6) Remarks
18	BODY, CAB, HOOD AND HULL – CONTINUED								
1806	Upholstery Seats and Carpets								
	Seat Assembly	Adjust	0.1						
		Replace		0.5					
		Repair				1.0			
24	HYDRAULIC AND FLUID SYSTEMS								
2401	Pump and Motor								
	Pump Assembly, Hydraulic	Test			0.5				
		Replace			1.0				
		Repair			2.0				
	Cover, Hydraulic	Replace			1.0				
		Repair			2.0				
2402	Manifold and/or Control Valves								
	Valve, Tilt Lock	Test		0.5					
		Replace		1.0					
		Repair			2.0				
	Valve, Assembly, Control	Replace			1.0				
		Repair			2.0				
2403	Hydraulic Controls and/or Manual Controls								
	Lever Assembly	Inspect		0.1					
		Replace			1.0				
	Base, Valve Linkage	Replace			1.0				
2404	Tilt Cylinders and Tilt Crank								
	Cylinder Assembly, Tilt	Service		0.2					
		Adjust		0.3					
		Replace		0.5					
		Repair			1.5				
2405	Mast Column								
	Mast Assembly	Service		0.3					
		Replace			2.0				
		Repair			1.0				
	Carriage Assembly, Lift	Service		0.3					
		Replace			2.0				
		Repair			1.0				
	Chain Assembly, Lift	Service		0.2					
		Adjust		0.5					
		Replace		0.5					
		Repair		1.0					
	Cylinder Assembly	Replace			2.0				
		Repair			2.0				

Section II. MAINTENANCE ALLOCATION CHART – CONTINUED

(1) Group number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance category C	O	F	H	D	(5) Tools and eqpt	(6) Remarks
24	HYDRAULIC AND FLUID SYSTEMS – CONTINUED								
2406	Strainers, Filters, Lines and Fittings								
	Filter, Sump, Breather	Service		0.1					
		Replace		0.3					
	Filter, Sump Hydraulic	Replace		0.5					
		Repair		0.7					

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Tool or test equipment ref code	(2) Maintenance category	(3) Nomenclature	(4) National stock number	(5) Tool number
		No Special Tools or Test Equipment Required.		

Section IV. REMARKS

(1) Reference code	(2) Remarks
	Not Applicable

Page 78, Left Column:

Line 1, delete "Cylinder head".

Line 2, delete "Cleaning and inspection, 17*b*, 31".

Line 3, delete "Installation, 17*c*, 31".

Line 4, delete "Removal, 17*a*, 30".

Line 44, delete "Cylinder head, 17, 30".

Line 57, delete "Valve adjustment, 18, 31".

Page 79, Left Column:

Line 12, Insert word "oil" between words "Hydraulic" and "tank".

Line 44, delete "Cylinder head, 17*c*, 31".

Line 52, delete "Generator 17*c*, 31".

Page 79, Right Column:

Line 4, delete "Service brakeshoes, 50*b*, 58".

Page 80, Left Column:

Line 14, delete "Cylinder head 17*a*, 30".

Line 33, delete "Service brakeshoes, 50*a*, 58".

Page 80, Right Column:

Line 4, delete "Installation, 50*b*, 58".

Line 5, delete "Removal, 50*a*, 58".

Page 81, Right Column:

Line 3, delete "Valve adjustment, 18, 31".

By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

Official:

DONALD J. DELANDRO
Brigadier General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-25A, Organizational Maintenance requirements for Warehouse Equipment.

TECHNICAL MANUAL
No. TM 10-3930-237-20

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *23 September 1964*

TRUCK, LIFT, FORK, GASOLINE, SOLID RUBBER TIRED WHEELS 2000-POUND CAPACITY ARMY MODEL MHE-192; CLARK MODEL C20B-1632032-100 (FSN 3930-781-3857); CLARK MODEL C20B-1632033-127 (FSN 3930-781-3858)

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CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

a. This manual is published for use by personnel responsible for the organizational maintenance of the forklift truck, models C20B–1632032–100 and C20B–1632033–127 (fig. 1), Clark Equipment Company, Battle Creek, Mich.

b. The direct reporting, by the individual user, of errors, omissions, and recommendations for improving this manual is authorized and encouraged. DA Form 2028 (Recommended Changes to DA Publications) will be used for reporting these improvements. This form will be completed in triplicate using pencil, pen, or typewriter. The original and one copy will be forwarded direct to the Commanding Officer, U. S. Army Mobility Equipment Center, ATTN: SMOME–MM, P. O. Drawer 58, St. Louis, Mo. 63166. One information copy will be provided to the individual's immediate supervisor (officer, noncommissioned officer, supervisor, etc.).

c. Report all equipment improvement recommendations as prescribed by TM 38–750.

2. Appendixes

Appendix I is a list of current references applicable to this manual. Appendix II contains the maintenance allocation chart. Appendix III, containing the repair parts and special tools lists, is published in the organizational maintenance repair parts and special tools lists manual, TM 10–3930–237–20P.

3. Forms, Records, and Reports

The maintenance forms, records, and reports to be used in the second echelon maintenance of this equipment are listed and described in TM 38–750.

4. Orientation

Throughout this manual, the terms *right*, *left*, *front*, and *rear*, with respect to the engine and truck, indicate directions from the viewpoint of the operator sitting in the seat of the truck.

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Figure 1. Forklift truck, models C20B–1632032–100 and C20B–1632033–127.

Section II. DESCRIPTION AND DATA

5. Description

a. General. The forklift truck is a gasoline engine-driven, torque converter-coupled, solid rubber tire-mounted, unit having hydraulically powered lift and tilt mechanisms. Its rated capacity is 2000 pounds, and it is designed for high maneuverability and operation in confined areas.

b. Engine. The engine is a four-cylinder, four-stroke cycle, liquid-cooled, gasoline-driven, L-head type, mounted toward the rear of the truck with the fan facing the rear. It uses a conventional distributor-type ignition system and is provided with an integral flyball-type governor. It uses a conventional float-type carburetor, and the fuel system incorporates a diaphragm-type fuel pump.

c. Drive System. The drive system consists of a torque converter; single speed, forward and reverse transmission; differential; and drive axle, all of which are inclosed in housings that are bolted together so that U-joints and propeller shafts are eliminated. Final reduction of the power train is at the wheels.

d. Hydraulic System. The hydraulic system consists of a hydraulic pump mounted on and driven by the engine, a reservoir built into the truck frame, a control valve operated by two control levers that provide load lifting and boom tilting controls, a tilt-lock valve that prevents the boom from tilting forward when the hydraulic system is not pressurized, two double-acting tilt cylinders that control the forward and reverse tilting of the uprights, and a two-stage, single-acting lift cylinder that hoists and lowers the load engaged by the forks on the front of the truck.

e. Steering System. The steering system consists of a steering gear, which is controlled by the steering handwheel, a steering gear to steering axle drag link, and a steering axle assembly with tie rods. The steering system turns the rear steering axle to control the direction of the truck. The pitman arm of the steering gear is connected direct to the steering gear to axle drag link.

f. Service Brake System. The service brake system consists of a brake pedal, brake master cylinder, two wheel cylinders, and an externally expanding brake mounting within the brake-drum of each front wheel. The brakedrums are rotated by the axle shafts before final reduction to insure highly effective brake action. Hydraulic brake fluid, pressurized by the brake master cylinder, operates the wheel cylinders to force the brake linings against the inside of the brakedrums, to slow down and stop the rotation of the brakedrums and wheels.

g. Parking Brake System. The parking brake is mounted within the transmission housing and is operated by the parking brake lever through a linkage. It consists of a V-pulley mounted on the transmission pinion shaft which is engaged by a V-shaped brakeshoe connected to the parking brake lever linkage in a manner that provides a great mechanical advantage so that the brakeshoe engages the pulley with force great enough to prevent the transmission pinion shaft from rotating. This prevents rotation of the drive wheels.

h. Mast and Carriage.

(1) The forks of the truck are mounted on a carriage which is raised and lowered on the mast. The carriage is provided with notches to permit varying the distance between forks to the distance required for the load being handled. The upright uses a two-stage system to raise the loads to the proper height.

(2) The first stage uses a chain arrangement whereby one end of the chain is anchored to the lift cylinder and the other end connected to the carriage. The chains are engaged by sprockets on the first-stage piston of the cylinder. As the first-stage piston extends, it causes the chains to pull the carriage upward. At the upper extreme of the first-stage piston, the end of the piston strikes the inner track of the mast and the second stage of the piston extends from the bottom of the cylinder, moving the cylinder, carriage, and inner track of the mast upward.

(3) Lowering is controlled by the hydraulic control valve which regulates the rate of hydraulic flow from the lift cylinder. The carriage and inner upright track move downward by force of gravity.

(4) Carriage is provided with rollers which roll up and down the inner track to provide easy movement of the carriage during fist-stage movement. The inner and outer tracks have rollers which operate during second-stage operation.

i. Differences in Models. The two models covered in this manual differ only in height of the mast assembly. Model C20B–1632032–100 has 100-inch lifting capabilities while model C20B–1632033–127 has 127-inch lifting capabilities. General configuration of mast assembly parts is the same; only dimensions are different.

6. Tabulated Data

a. Capacities.

Cooling system	9 qt
Crankcase (with filter)	7.8 pt
Fuel tank	6½ gal
Air cleaner	1 pt
Hydraulic system	3.4 gal
Transmission and differential	15 qt
Axle end	1 lb

b. Dimension and Weight.

Ground clearance (at mast center)	3 7/16 in.
Height (uprights extended):	
Model C20B–1632032–100	120 7/16 in.
Model C20B–1632033–127	147 7/16 in.
Height (uprights retracted):	
Model C20B–1632032–100	68 in.
Model C20B–1632033–127	81⅛ in.
Lift height:	
Model C20B–1632032–100	100 in.
Model C20B–1632033–127	127 in.
Length:	
Overall	105⅛ in.
Forks	36 in.
Width	32 in.
Weight:	
Model C20B–1632032–100	4365 lb
Model C20B–1632033–127	4565 lb

c. Performance.

Travel speeds:	
Loaded (forward and reverse)	8 mph
Empty (forward and reverse)	8 mph
Load capacity	2000 lb

d. Engine.

Make	Continental
Model	YS116–6015
Number of cylinders	Four
Governed speed:	
No load	2300 rpm
Loaded (rated)	2200 rpm
Firing order	1–3–4–2

e. Transmission, Differential, and Drive Axle.

Speeds	One forward, one reverse
Transmission ratio:	
Forward	7.46 to 1
Reverse	7.33 to 1
Drive axle ratio	4.375 to 1

f. Electrical System.

Type	12-volt, negative ground.
Distributor:	
Rotation (viewed from cap end)	Counterclockwise
Contact point gap	0.022 in.
Spark plug gap	0.025 in.
Generator output (at 1970 rpm generator speed).	14 volts

CHAPTER 2
OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

7. Unloading the Equipment

a. The unloading procedure depends upon the facilities available at the unloading site. If a crane is available, the unit can be lifted from the trailer to flatcar. If a loading dock is available, the unit can be driven from the carrying vehicle. If neither of these facilities is available, construct a ramp capable of supporting the more than 4565 pound weight of the truck and drive the unit from the carrying vehicle. If the equipment is to be driven from the carrying vehicle, inspect the equipment and service (para. 8).

b. Lift the truck from the carrying vehicle as follows:

(1) Remove the tiedown cables that secure the truck to the carrying vehicle.

(2) Use cables with hooks and a spreader bar (fig. 2) to handle the truck for unloading. Lifting notches in the frame are designated "LIFT HERE." Lift the truck a few inches to make sure the weight is correctly distributed; then hoist it from the vehicle.

c. Drive the truck from the carrying vehicle, using a loading dock or specially constructed ramp as follows:

(1) Inspect and service the truck (para. 8).

(2) Start the engine.

(3) Remove the tiedown cables and blocking that secure the truck to the carrying vehicle.

(4) Operate the direction shift lever forward to move the truck forward or to the rear to back the truck. Check the brakes against engine power to make sure they are operating satisfactorily.

(5) Drive the truck from the vehicle.

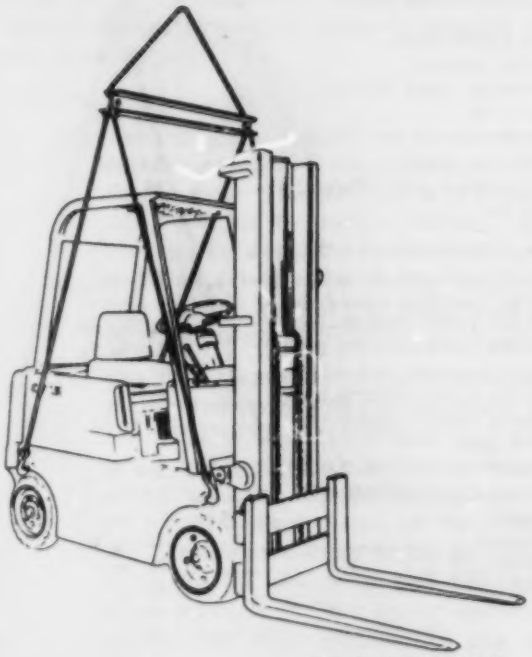

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Figure 2. Truck lifting diagram.

8. Inspecting and Servicing Equipment

a. Inspection.

(1) Check the exterior of the forklift truck for loosely mounted or damaged components. Tighten loose mounting bolts. Report any damage to the proper authority.

(2) Check the forklift for leaks. Tighten leaking hose or fittings.

(3) Swing out the engine side panels and the battery to provide access to the engine. Lift up on the hood and seat assembly until it latches. Remove the

packages containing the headlight and the battery electrolyte that are taped in the engine compartment.

(4) Check all engine components for secure mounting and for damage that occurred during shipping. Tighten loose mounting bolts. Report any damage to the proper authority.

b. Service.

(1) Unwrap the headlight. Position the headlight on the left side of the mast; secure with a screw (7, fig. 36), two washers (8), and a nut (10). Connect the electrical leads.

(2) Remove the caps from the battery. Fill the battery cells to the tops of the split rings, using the electrolyte that was packed separately. Make sure all switches and electrical accessories are off. Connect the battery cables to the battery, carefully observing the polarity indicated on the battery cables and on the battery.

(3) Check the coolant level in the radiator; if necessary, add coolant to the required level.

(4) Check the level of the engine lubricating oil; if the level is at or below the ADD mark on the dipstick, add oil as directed in the lubrication order (fig. 3).

(5) Check the oil level in the hydraulic reservoir. The oil must reach the lower end of the filler tube. Add oil as indicated in the lubrication order if level is low.

(6) Check the oil level in the transmission. If necessary, add oil to the level indicated in the lubrication order.

9. Run-In Test

a. Inspect and service the forklift truck (para. 8).

b. Start the engine, allow it to warm up, and move the truck forward. The truck must accelerate smoothly without jerking.

c. Depress the brake pedal to apply the brake. The truck must slow down and come to a halt smoothly and evenly, without brakes grabbing, squealing, or pulling.

d. Maintain pressure on the brake pedal and lightly depress the accelerator pedal. The engine speed must increase easily, indicating that the brake application has caused a transmission disconnect. Ease up on the pedal. The truck must inch forward as the pedal approaches the released position.

e. Move the direction shift lever to the rear to cause reverse movement of the truck. Depress the accelerator pedal and check the reverse movement. The truck must move smoothly and evenly.

f. While moving the truck, turn the steering wheel to the left and to the right to check steering characteristics. The steering wheels must move left or right easily.

g. Apply the brake pedal to stop truck movement. Apply the parking brake and lightly depress the accelerator pedal to check holding of the parking brake. The truck must remain stopped. Release the parking brake.

h. Depress and hold the brake pedal. Shift the transmission shift lever into neutral. Depress the accelerator pedal to operate the engine at a fast idle. Pull back on the lift control lever. The forks and carriage must raise. Continue to hold the lift control lever to the rear. The carriage must raise to the end of the first stage after which the second stage of the lift cylinder takes over and raises the carriage, the inner track of the mast, and the lift cylinder. When the second stage is fully extended, the upward movement will stop. Release the lift control lever. It must return to the center position, and the forks and carriage must remain in the raised position.

i. Push forward on the lift control lever. The forks and carriage must descend. The rate of descent is controlled by the position of the lever and the cylinder flow control valve. Move the lever to the center position several times during the downward movement. When the lever is centered, the downward movement must stop. Raise and lower the carriage and forks several times. Movement must be smooth and free with no chattering or binding.

j. With the forks raised approximately 1 foot from the floor, accelerate the engine to fast idle and pull back on the tilt control lever. The mast must tilt back toward the body of the truck.

Move the tilt control lever forward; the mast must tilt forward away from the truck. Whenever the tilt control lever is centered, tilting movement of the mast must stop. Movement must also stop when the mast reaches its extremes of travel.

k. During operation, check that the ammeter remains in the charging range. The engine oil pressure gage indicates between 25 and 35 psi when the engine is operating at normal operating speeds. The engine temperature indicator registers between 160° F. and 180° F., during normal operation, and the transmission oil temperature light remains off.

Caution: **Shut down the engine immediately if the transmission oil temperature light glows. This indicates an overheated transmission. Continued operation could cause severe damage to the unit.**

CHAPTER 3
MAINTENANCE INSTRUCTIONS

Section I. LUBRICATION

10. General

Lubrication Order 10–3930–237–20 prescribes lubrication maintenance for the forklift truck, and compliance with its instructions is mandatory at all levels of maintenance. If a forklift truck is received without a lubrication order, the using organization must requisition a copy through normal channels in accordance with provisions of AR 310–1.

11. Lubrication Instructions

The lubrication order is illustrated in figure 3. Numbers that have been superimposed around the border of the lubrication order refer to specific lubrication points that are illustrated in figure 3.

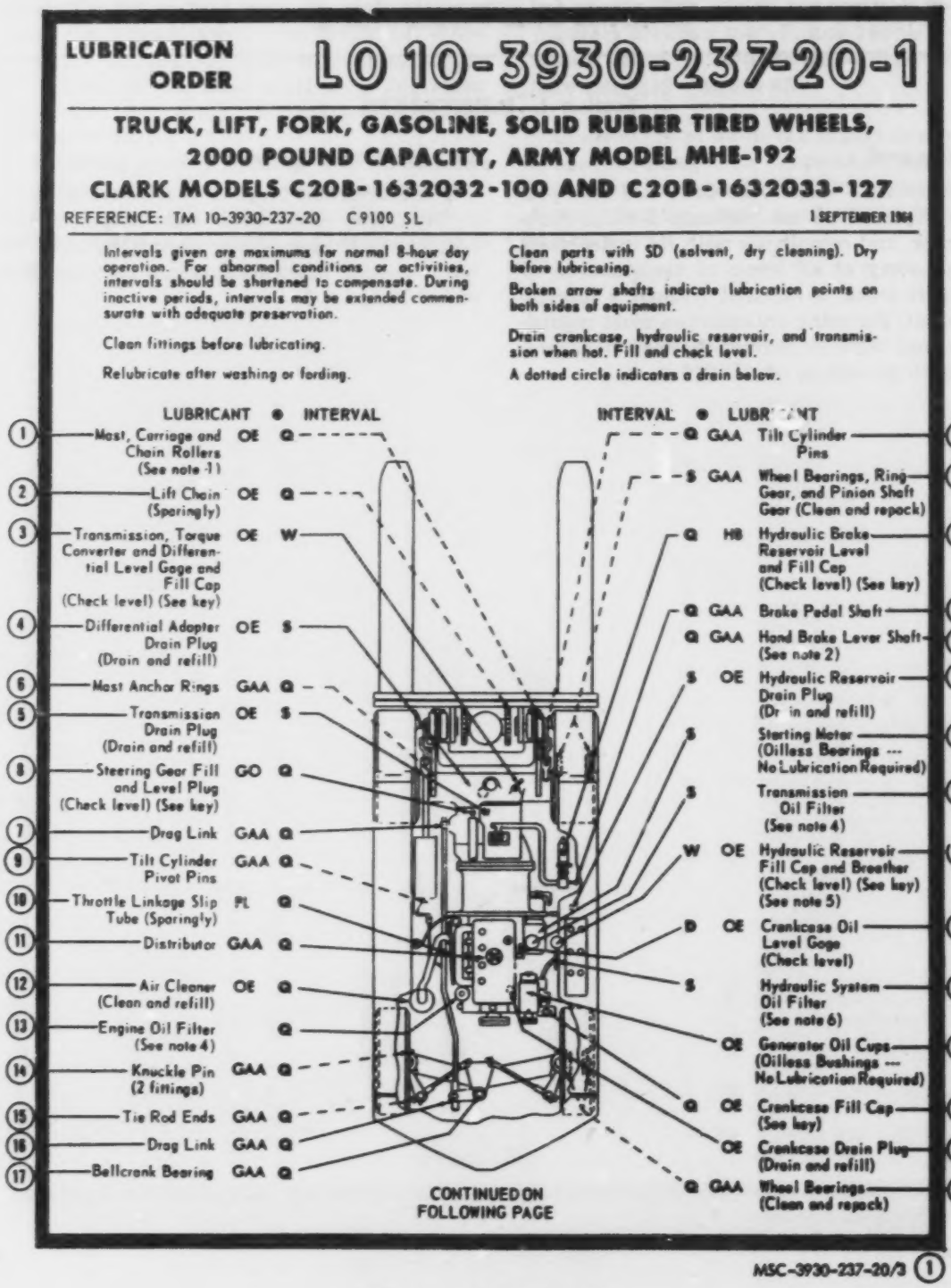
LUBRICATION ORDER
LO 10-3930-237-20-1
TRUCK, LIFT, FORK, GASOLINE, SOLID RUBBER TIRED WHEELS, 2000 POUND CAPACITY, ARMY MODEL MHE-192
CLARK MODELS C20B-1632032-100 AND C20B-1632033-127
REFERENCE: TM 10-3930-237-20 C9100 SL
1 SEPTEMBER 1964
Intervals given are maximums for normal 8-hour day operation. For abnormal conditions or activities, intervals should be shortened to compensate. During inactive periods, intervals may be extended commensurate with adequate preservation.
Clean fittings before lubricating.
Relubricate after washing or fording.
Clean parts with SD (solvent, dry cleaning). Dry before lubricating.
Broken arrow shafts indicate lubrication points on both sides of equipment.
Drain crankcase, hydraulic reservoir, and transmission when hot. Fill and check level.
A dotted circle indicates a drain below.
LUBRICANT ● INTERVAL
1 Mast, Carriage and Chain Rollers (See note 1) OE Q
2 Lift Chain (Sparingly) OE Q
3 Transmission, Torque Converter and Differential Level Gage and Fill Cap (Check level) (See key) OE W
4 Differential Adapter Drain Plug (Drain and refill) OE S
6 Mast Anchor Rings GAA Q
5 Transmission Drain Plug (Drain and refill) OE S
8 Steering Gear Fill and Level Plug (Check level) (See key) GO Q
7 Drag Link GAA Q
9 Tilt Cylinder Pivot Pins GAA Q
10 Throttle Linkage Slip Tube (Sparingly) PL Q
11 Distributor GAA Q
12 Air Cleaner (Clean and refill) OE Q
13 Engine Oil Filter (See note 4) Q
14 Knuckle Pin (2 fittings) GAA Q
15 Tie Rod Ends GAA Q
16 Drag Link GAA Q
17 Bellcrank Bearing GAA Q
INTERVAL ● LUBRICANT
Q GAA 18 Tilt Cylinder Pins
S GAA 19 Wheel Bearings, Ring Gear, and Pinion Shaft Gear (Clean and repack)
Q HB 20 Hydraulic Brake Reservoir Level and Fill Cap (Check level) (See key)
Q GAA 21 Brake Pedal Shaft
Q GAA 22 Hand Brake Lever Shaft (See note 2)
S OE 23 Hydraulic Reservoir Drain Plug (Drain and refill)
S 24 Starting Motor (Oilless Bearings — No Lubrication Required)
S 25 Transmission Oil Filter (See note 4)
W OE 26 Hydraulic Reservoir Fill Cap and Breather (Check level) (See key) (See note 5)
D OE 27 Crankcase Oil Level Gage (Check level)
S 28 Hydraulic System Oil Filter (See note 6)
OE 29 Generator Oil Cups (Oilless Bushings — No Lubrication Required)
Q OE 30 Crankcase Fill Cap (See key)
OE 31 Crankcase Drain Plug (Drain and refill)
Q GAA 32 Wheel Bearings (Clean and repack)
CONTINUED ON FOLLOWING PAGE
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Figure 3. Lubrication order.

Section II. PREVENTIVE MAINTENANCE SERVICES

12. General

a. Preventive maintenance is defined as the systematic care, inspection, and servicing of equipment to maintain it in serviceable condition, to prevent breakdowns, and to assure maximum operational capability.

b. The services described in this section are those which must be performed by second echelon maintenance personnel at regularly scheduled intervals. The organization mechanic may be assisted by the operator in performing these services.

Table 1. Antifreeze Requirements

Lowest expected temperature (° F.)	Ethylene glycol required (qt)*
+20	2
+10	3
0	4
—10	4½
—20	5
—30	5½
—40	6

*Corrected to the nearest half quart.

CONTINUED FROM PRECEDING PAGE

-KEY-

LUBRICANTS	CAPACITY	EXPECTED TEMPERATURES			INTERVALS
		Above +32°F	+40° to -10°F	0° to -65°F	
OE - OIL, LUBRICATING		OE 30	OE 10	OES	D - Daily W - Weekly Q - Quarterly S - Six Month
Air Cleaner	1 pt.				
Crankcase					
Generator					
Oil Can Points					
Lift Chain					
Mast, Carriage, and Chain Rollers					
Transmission, Torque Converter and Differential	15 qt.	OE 10	OE 10	OES	
Hydraulic Steering System					
GAA - GREASE, Automotive and Artillery		All Temperatures			
Rear Wheel Bearings					
Front Wheel Bearings, Ring Gear, and Pinion Gear	1 lb.				
Throttle Linkage Slip Tube					
GO - OIL, Gear Lubricant		GO 90	GO 90	GOS	
Steering Gear					
HB - HYDRAULIC Brake Fluid		HB	HB	HBA	
OE - OIL, LUBRICATING		OE 10	OE 10	OES	
Hydraulic Lift System					
PL - LUBRICATING OIL, General Purpose					

NOTES:

1. MAST, CARRIAGE, AND CHAIN ROLLERS. Inject lubricant through rubber seal with hypodermic syringe and needle.

2. HAND BRAKE LEVER SHAFT. Remove floor plate, lubricate using gun with flexible connection, install floor plate.

3. OIL CAN POINTS. Every 100 hours lubricate throttle, shift, and hydraulic levers and linkages, parking brake handle, hood latches and hinges, and seat adjuster with OE.

4. ENGINE AND TRANSMISSION OIL FILTERS. Remove element, clean housing, install new element, operate engine or transmission, check filter for leaks, check transmission or crankcase oil level and bring to FULL mark.

5. HYDRAULIC RESERVOIR FILL CAP AND BREATHER. Every 100 hours clean breather by tapping on a wood block or bench, or replace.

6. HYDRAULIC SYSTEM OIL FILTER. Drain hydraulic reservoir, disconnect hydraulic hose, remove filter, flush reservoir, replace filter element, install filter, connect hose, fill reservoir, check for leaks.

A copy of the lubrication order will remain with the equipment at all times; instructions contained herein are mandatory and supersede all conflicting orders issued prior to this date.

BY ORDER OF THE
SECRETARY OF THE ARMY:

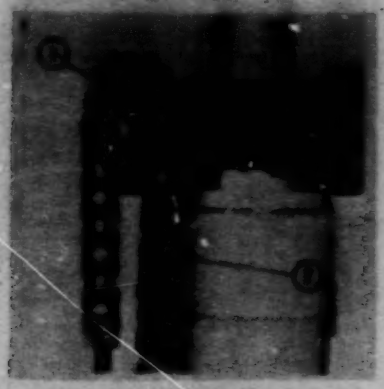
Earle G. Wheeler
General, United States Army
Chief of Staff

OFFICIAL:

J. C. Lambert
Major General, United States Army,
The Adjutant General

MSC-3930-237-20/3 (2)

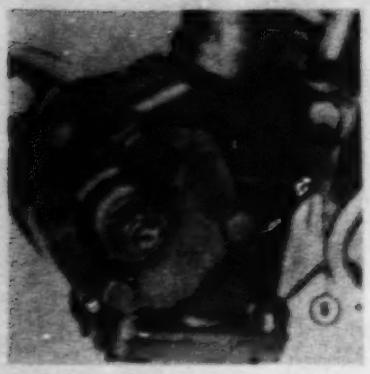
Figure 3—Continued.



Ref. 1. Lift Chain Sprocket
Ref. 2. Lift Chain

Ref. 6. Mast Anchor Rings
Ref. 7. Drag Link

Ref. 3. Transmission, Torque Converter and Differential Level Gauge and Fill Cap.



Ref. 8. Steering Gear Fill and Level Plug

Ref. 4. Differential Adapter Drain Plug
Ref. 5. Transmission Drain Plug

Ref. 9. Tilt Cylinder Anchor Pin

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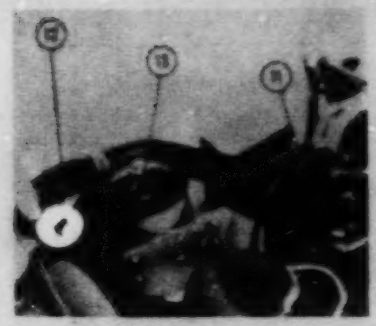
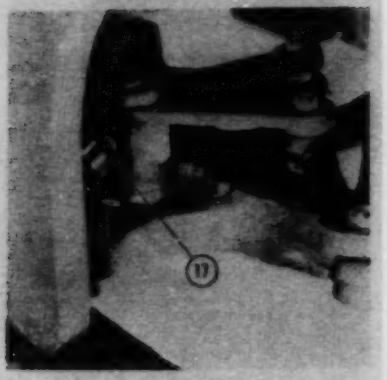
Figure 3—Continued.

Ref. 10. Accelerator Rod Slip Tube

Ref. 15. Tie Rods
Ref. 16. Drag Link



Ref. 11. Distributor
Ref. 12. Air Cleaner
Ref. 13. Engine Oil Filter



Ref. 17. Steering Axle Spider

Ref. 14. Knuckle Pin

Ref. 18. Tilt Cylinder Pivot Pin

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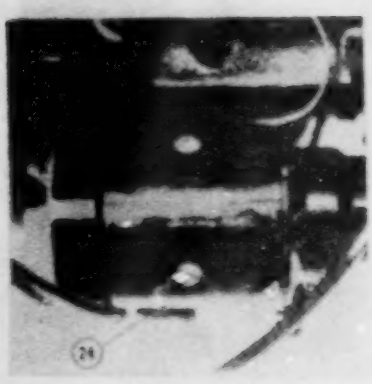
Figure 3—Continued.

Ref. 19. Wheel Bearings, Ring Gear, and Pinion Shaft Gear

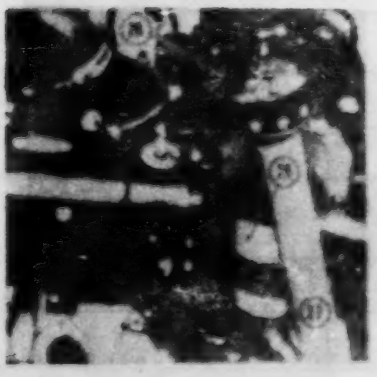
Ref. 23. Hydraulic Reservoir Drain Plug

Ref. 20. Master Cylinder Reservoir
Ref. 21. Service Brake Pedal Pivot Pin



Ref. 24. Starting Motor

Ref. 22. Hand Brake Pivot Arm



Ref. 25. Transmission, Converter Oil Filter
Ref. 26. Hydraulic Sump Air Cleaner and Filler Tube
Ref. 27. Crankcase Oil Level Gauge

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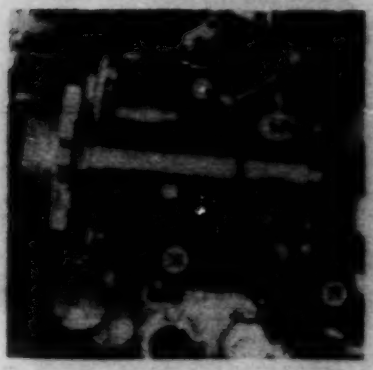
Figure 3—**Continued.**

Ref. 28. Hydraulic System Oil Filter

Ref. 31. Crankcase Drain Plug



Ref. 29. Generator
Ref. 30. Crankcase Filler Cap

Ref. 32. Wheel Bearings

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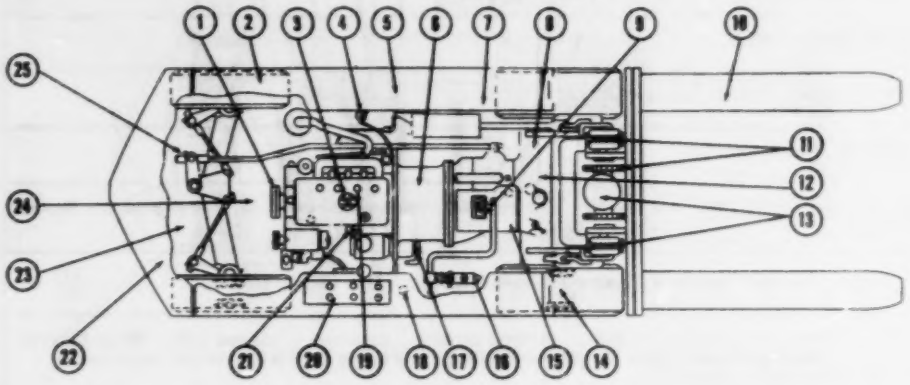
Figure 3—Continued.

PREVENTIVE MAINTENANCE SERVICE
QUARTERLY

TM 10-3930-237-20 | CLARK MODELS C208-1632032-100 C208-1632033-127 | TRUCK, FORKLIFT



LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER

ITEM		PAR. REF.
1.	BELTS. Check for worn, frayed, or cracked belt. Proper adjustment is a deflection of 3/4 to 1 inch between crankshaft pulley and fan pulley. (weekly)	35
2.	TIRES. Check for cuts. Remove foreign material from tires. (weekly)	
3.	DISTRIBUTOR. Check for burned points. Replace if necessary. Gap at 0.022.	40
4.	FUEL FILTER. Remove bowl. Clean.	25
5.	FUEL TANK. Add fuel as required.	
6.	TRANSMISSION. Check for leaks. Check linkage for operation.	46
7.	HORN. Check operation.	
8.	CONTROLS AND INSTRUMENTS. Inspect for damage and loose mountings. With unit operating, check for proper operation. Normal operating readings for instruments are as follows: Oil pressure gage 30 psi Water temperature gage 160° to 180° F Ammeter slight positive charge	42
9.	BRAKE PEDAL. Check operation for pressure and free travel.	53
10.	LIFT FINGERS. Check for defects.	
11.	LIFT CHAINS, MAST AND CARRIAGE ROLLERS. Check for cracked, broken, or excessively worn links or rollers. (weekly)	66

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Figure 4. Preventive maintenance services.

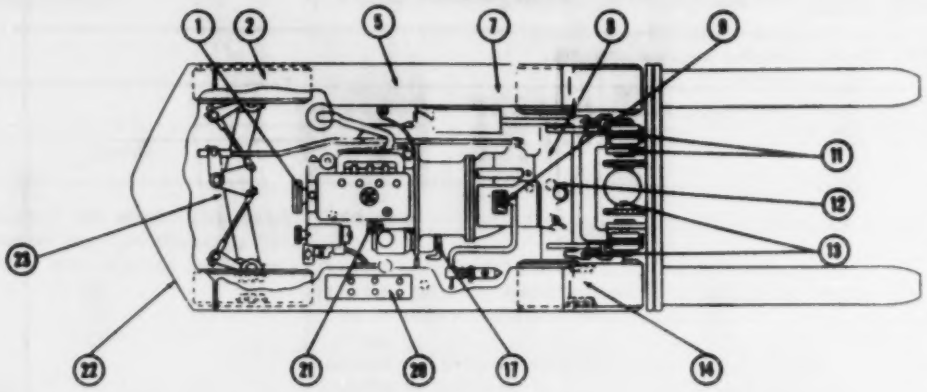
ITEM		PAR. REF.
12.	DRIVE AXLE. Check for leaks. (weekly)	
13.	LIFT AND TILT CYLINDERS. Check for leaks. (weekly)	65
14.	FIRE EXTINGUISHERS. Inspect for broken seal.	
15.	PARKING BRAKE. Adjust	49
16.	MASTER CYLINDER. Check fluid level.	51
17.	HANDBRAKE. Check operation.	49
18.	HYDRAULIC OIL RESERVOIR. Add hydraulic oil as required. Reference current L. O. Check breather. Replace if necessary.	67
19.	SPARK PLUGS. Check. Replace if necessary. Gap to 0.025.	41
20.	BATTERY. Tighten loose cables and mountings. Remove corrosion. Inspect for cracks and leaks. Fill to 1/2 inch above plates. Clean vent holes in filler caps before installing. In freezing weather, run engine a minimum of 1 hour after adding water. (weekly)	43
21.	OIL LEVEL GAGE. Add oil as indicated by level gage. Reference current L. O..	
22.	LIGHTS. Check for defective lamps or lamp units.	44
23.	RADIATOR. Proper coolant level is 1 inch below filler neck. Check hoses for leaks and soft spots.	32
24.	FAN. Check for loose, bent, or damaged blades.	
25.	MUFFLER. Check muffler and exhaust pipe for obstructions, cracks, corrosion or other damage.	30
	NOTE 1. OPERATION. During operation observe for unusual noise or vibration.	

Figure 4—Continued.

PREVENTIVE MAINTENANCE SERVICE

DAILY

TM 10-3930-237-20 | CLARK MODELS C208-1632032-100 C208-1632033-127 | TRUCK, FORKLIFT



LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER

ITEM		PAR. REF.
1.	BELTS. Check for belt tension. Proper deflection is 3/4 to 1 inch midway between crankshaft and fan pulley. (weekly)	35
2.	TIRES. Check for cuts. Remove foreign material from tires. (weekly)	
5.	FUEL TANK. Check fuel level	
7.	HORN. Check operation	
8.	CONTROLS AND INSTRUMENTS. Inspect instruments for proper operation as follows: Oil pressure gage — 30 psi; Water temperature gage — 160° to 180° F; Ammeter — slight positive charge	42
9.	BRAKE PEDAL. Check operation for pressure and free travel.	53
11.	LIFT CHAIN, MAST AND CARRIAGE ROLLERS. Check for cracked, broken, or excessively worn links. (weekly)	66
12.	DRIVE AXLE. Check for leaks.(weekly)	
13.	LIFT AND TILT CYLINDERS. Check for leaks. (weekly)	65
14.	FIRE EXTINGUISHER. Inspect for broken seal.	
17.	HAND BRAKE. Check operation	49

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Figure 5. Preventive maintenance services.

ITEM		PAR. REF.
20.	BATTERY. Tighten loose cables and mountings. Remove corrosion. Inspect for cracks and leaks. Fill to 1/2 inch above plates. Clean vent holes in filler caps before installing. In freezing weather, run engine a minimum of 1 hour after adding water. (weekly)	43
21.	OIL LEVEL GAGE. Add oil as indicated by level gage. Reference current L. O.	
22.	LIGHTS. Check for defective lamps and lamp units.	44
23.	RADIATOR. Check coolant level. Proper coolant level is 1 inch below filler neck.	32

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Figure 5—Continued.

Section III. TROUBLESHOOTING

13. Purpose

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the forklift truck or any of its components.

14. Troubleshooting Procedure

Possible troubles that may be encountered are listed in table 2. Each trouble symptom stated is followed by a list of probable causes of the trouble. The possible remedy is described opposite the probable cause.

Table 2. Troubleshooting Chart

Trouble	Probable cause	Remedy
Engine will not start. (No spark. Ammeter shows no discharge. Zero reading with ignition switch on.)	Ignition switch partly on	Turn switch on fully.
	Ignition switch defective	Replace switch.
	Ignition primary wires or starting motor cables broken or connections loose.	Repair or replace and tighten.
	Ignition coil primary winding open	Replace coil.
	Distributor points dirty	Clean and adjust points.
	Distributor points not closing	Adjust or replace points.
	Loose or corroded ground or battery cable connections.	Remove, clean, reinstall, tighten cable clamps.
Engine will not start. (Ammeter shows abnormal discharge with ignition switch on.)	Defective condenser	Replace condenser.
	Short-circuited or burned distributor cap or rotor.	Replace defective parts.
	Short-circuited wire between ammeter and ignition switch.	Repair or replace wire.
	Short-circuited primary winding in ignition coil.	Replace coil.
Engine will not start (weak spark)	Distributor points not opening	Clean or replace and adjust points.
	Distributor points pitted or burned	Clean or replace.
	Distributor condenser weak	Replace condenser.
	Ignition coil weak	Replace coil.
	Primary wire connections loose	Tighten connections.
	High-tension wires, spark plug wires, or distributor cap wet.	Dry thoroughly.
	High-tension wires, spark plug wires, or distributor cap damaged.	Replace defective parts.
	Distributor cap or rotor burned or broken.	Replace defective parts.
	Spark plug gap incorrect	Reset gaps.
	Short-circuited secondary circuit in coil.	Replace coil.
Engine will not start (good spark)	Fuel tank empty	Refill tank.
	Dirt or water in carburetor or float stuck.	Replace carburetor.
	Carburetor and engine flooded by excessive use of choke.	Depress accelerator pedal fully and crank engine with starting motor; when engine starts, release throttle and leave choke control in.
	Fuel not reaching carburetor	Inspect for damaged or leaky lines or air leak into line between tank and fuel pump.
	Dirt in fuel lines or tank	Disconnect lines, drain tank, and blow out lines.
	Fuel line pinched	Repair or replace line.

Table 2. Troubleshooting Chart—Continued

Trouble	Probable cause	Remedy
	Ignition wires incorrectly installed in distributor cap.	Install wires correctly.
	Ignition timing incorrect	Reset timing.
	Fuel filter clogged	Replace filter cartridge.
	Fuel pump not pumping	Replace pump.
	Lack of engine compression	Report to proper authority.
	Choke improperly adjusted	Adjust choke.
Engine backfires	Ignition out of time	Reset timing.
	Spark plug wires incorrectly installed in distributor cap or at spark plugs.	Install wires correctly.
	Distributor cap cracked or shorted	Replace cap.
	Valve holding open	Report to proper authority.
Engine operates erratically	Improper ignition timing	Reset timing.
	Spark plug wires incorrectly installed in distributor cap.	Install wires correctly.
	Dirt or water in carburetor	Drain carburetor; clean fuel system.
	Carburetor improperly adjusted.	Adjust carburetor.
	Valve sticking, not seating properly, burned, or pitted.	Report to proper authority.
	Excessive carbon on cylinder head	Remove carbon from cylinder head.
	Valve springs weak	Report to proper authority.
	Fuel pump pressure low	Replace pump.
	Fuel filter clogged	Replace filter cartridge.
	Partly clogged or pinched fuel lines	Clean and repair lines.
	Intake manifold leak	Inspect gaskets and tighten manifold stud nuts.
	Distributor cap cracked or shorted	Replace cap.
Eingine stalls on idle	Carburetor throttle valve closes too far or idle mixture incorrect.	Adjust carburetor.
	Carburetor choke remaining closed	Adjust choke cable.
	Dirt or water in idler passages of carburetor.	Replace carburetor.
	Air leak at intake manifold	Tighten manifold stud nuts or replace gaskets.
	Spark plugs defective, gaps incorrect	Clean or replace spark plugs; set gap clearance.
	Ignition timing early	Reset timing.
	Low compression	Report to proper authority.
	Water leak in cylinder head or head gaskets.	Replace gasket or cylinder head.
Engine misfires on one or more cylinders.	Dirty spark plugs	Clean, adjust, or replace plugs.
	Spark plug gap incorrect	Reset gaps.
	Cracked spark plug porcelain	Replace spark plug.
	Spark plug wires grounded	Replace wires.
	Spark plug wires incorrectly installed in cap or at spark plugs	Install wires correctly.
	Distributor cap or rotor burned or broken.	Replace defective parts.
	Valve tappet holding valve open	Report to proper authority.
	Low engine compression	Report to proper authority.
	Leaking cylinder head gasket	Replace gasket.
	Cracked cylinder block or broken valve tappet or tappet screw.	Report to proper authority.
Engine does not idle properly	Spark plugs dirty or gaps too close	Clean and adjust spark plugs.
	Ignition timing incorrect	Reset timing.
Engine misses at high speeds	Spark plugs dirty, defective, or incorrectly gapped.	Clean and set or replace spark plugs.

Table 2. Troubleshooting Chart—Continued

Trouble	Probable cause	Remedy
	Ignition coil or condenser weak	Replace defective parts.
	Distributor points sticking, dirty, or improperly adjusted.	Clean, adjust, or replace points.
	Distributor rotor or cap cracked or burned.	Replace defective parts.
	Leaking cylinder head gasket	Replace gasket.
	Uneven cylinder compression	Report to proper authority.
	Leaking high-tension or spark plug wires; cracked insulation.	Replace defective parts.
	Carburetor choke not adjusted	Adjust coke.
	Defective carburetor accelerating pump system, dirt in metering jets, or incorrect float level.	Replace carburetor.
	Fuel pump defective, causing lack of fuel.	Replace fuel pump.
	Air cleaner dirty	Clean air cleaner and refill oil cup.
	Valves sticking; weak or broken valve springs.	Report to proper authority.
	Fuel filter clogged	Replace filter cartridge; remove and clean strainer.
	Weak distributor breaker arm spring	Replace point set.
	Excessive play in distributor shaft bearing.	Replace distributor.
Engine pings	Ignition timing early	Reset timing.
	Distributor automatic spark advance stuck in advance position, or spring broken.	Replace distributor.
	Excessive carbon deposit in cylinders	Remove cylinder head and clean.
	Incorrect fuel	Drain; use correct fuel.
Engine lacks power	Ignition timing late	Reset timing.
	Incorrect fuel	Use correct fuel.
	Leaking cylinder head gasket	Replace gasket.
	Excessive carbon formation	Remove cylinder head and clean cylinder head, piston heads, cylinder
	Engine running cold	Test thermostat; in cold weather, block, and valves. cover air intake under driver's seat.
	Insufficient oil or improper grade of oil.	Lubricate in accordance with lubrication order (fig. 3).
	Oil system failure	Report to proper authority.
	Air cleaner dirty	Clean air cleaner, change oil in cup.
	Spark plug gaps too wide	Reset gaps.
	Choke partially closed, or throttle not opening fully.	Adjust choke, accelerator pedal and governor linkage.
	Exhaust pipe, muffler, or tailpipe obstructed.	Remove obstructions or replace parts.
	Low compression, broken valve springs, sticking valves.	Report to proper authority.
	Improper tappet adjustment	Adjust tappets.
	Lack of fuel	Clean filter, inspect fuel pump, inspect carburetor for water or dirt, and replace if necessary.
High engine oil consumption	High engine speeds	Adjust governor.
	Oil leaks	Replace leaking gaskets.
	Improper grade of oil or diluted oil	Use new oil of proper grade.
	Overheating of engine causing thinning of oil.	See "Engine overheats" below.

Table 2. Troubleshooting Chart—Continued

Trouble	Probable cause	Remedy
	Defective piston or rings, excessive side clearance of intake valves in guides, cylinder bores worn (scored, out-of-round, tapered), worn or damaged seals.	Report to proper authority.
Low engine oil pressure	Insufficient oil supply	Fill crankcase to prescribed level.
	Improper grade of oil or diluted oil foaming at high speeds.	Change oil, inspect crankcase ventilator, and inspect for water in oil.
	Oil too heavy	Change to proper grade oil. Refer to lubrication order (fig. 3).
	Oil leaks	Report to proper authority.
	Oil pump faulty, pressure regulator valve stuck or improperly adjusted, or spring broken.	Report to proper authority.
Abnormal engine	Loose fan, fan pulley, or belt	Tighten or correct conditions as required.
	Leaking exhaust or intake manifold or gaskets, cylinder head gasket, or spark plugs.	Tighten loose components or replace gaskets.
	Clogged exhaust system	Remove obstruction or replace defective parts.
Poor engine compression	Incorrect tappet adjustment	Adjust tappets.
	Leaking, sticking, or burned valves; sticking tappets, valve spring weak or broken; valve stems and guides worn; piston ring grooves worn or rings worn, broken, or stuck; cylinder bores scored or worn.	Report to proper authority.
Fuel does not reach carburetor	No fuel in fuel tank	Fill fuel tank.
	Fuel filter clogged	Replace filter cartridge.
	Fuel line air leak between tank and fuel pump.	Repair or replace line.
	Fuel line clogged	Disconnect and blow out lines.
	Fuel tank cap vent clogged	Clean vent.
	Fuel pump defective	Replace pump.
Fuel reaches carburetor, but does not reach cylinders.	Choke not closing	Adjust choke control.
	Fuel passage in carburetor clogged	Replace carburetor.
	Carburetor float valve stuck closed	Replace carburetor.
High fuel consumption	Incorrect adjustment of carburetor	Adjust carburetor.
	Vehicle overloaded	Reduce loads to specified maximum capacity.
	Tires improperly inflated	Inflate tire properly.
	Tight brakes	Adjust brakes.
	High engine speeds	Readjust governor.
	Air cleaner clogged	Clean air cleaner and change oil in cup.
	Carburetor float level too high; accelerating pump not properly adjusted.	Replace carburetor.
	Fuel line leaks	Correct leaks; replace lines.
	Overheated engine	See "Engine Overheats" below.
	Carburetor parts worn or broken	Replace carburetor.
	Fuel pump pressure too high or diaphragm leaking.	Replace fuel pump.
	Engine running cold	Inspect thermostat; cover radiator in winter.
	Ignition incorrectly timed	Reset timing.

Table 2. Troubleshooting Chart—Continued

Trouble	Probable cause	Remedy
	Spark advance stuck	Replace distributor.
	Leaking fuel filter bowl gasket	Replace gasket.
	Low engine compression	Report to proper authority.
	Choke partially closed	Adjust choke control.
	Engine idling too fast	Adjust carburetor idle speed adjust screw.
	Spark plugs dirty	Clean and gap or replace spark plugs.
	Weak coil or capacitor	Replace coil or capacitor.
	Clogged muffler or bent exhaust pipe	Remove obstruction or replace defective parts.
Low fuel pressure	Air leak in fuel lines	Tighten connections; repair lines if damaged.
	Fuel pump defective, diaphragm broken; valves leaking, linkage worn.	Replace fuel pump.
	Fuel lines clogged	Clean or replace lines.
Engine idles too fast	Improper carburetor throttle stop adjustment.	Adjust throttle stop screw.
	Accelerator linkage sticking	Free and lubricate linkage.
	Accelerator linkage return spring weak.	Replace spring.
Fuel gage does not register	Loose wire connection at instrument panel or tank unit.	Tighten connections.
	Instrument panel unit or tank unit inoperative.	Replace unit.
Loss of coolant	Loose hose connections	Tighten hose connections.
	Damaged or deteriorated hose	Replace hoses.
	Leaking radiator	Replace radiator.
Engine too cool during operation	Thermostat sticking	Replace thermostat and gasket.
	Low air temperature	Cover radiator.
Engine overheats	Airflow through radiator core restricted.	Clean radiator core from counterweight side with compressed air or water.
	Coolant level low	Fill radiator to proper level.
	Clogged radiator core	Clean by flushing radiator.
	Thermostat stuck	Replace thermostat.
	Cylinder head gasket leaking	Tighten cylinder head stud nuts and/or replace gasket.
	Damaged or deteriorated hose or fan belt.	Replace defective parts.
	Radiator or water pump leaking	Replace defective parts.
	Loose fan belt	Adjust fan belt tension.
	Cylinder block or head leaking	Report to proper authority.
	Ignition timing incorrect	Reset timing.
	Damaged muffler; bent or clogged exhaust pipe.	Replace defective parts.
	Excessive carbon in cylinders	Remove cylinder head and clean cylinder head, piston head cylinder block, and valves.
	Insufficient oil or improper grade of oil.	Refer to lubrication order (fig. 3).
	Air cleaner restricted	Clean air cleaner and change oil in cup.
	Water pump impeller broken	Replace pump.
	Poor compression	Report to proper authority.
	Valve timing incorrect	Reset timing.

Table 2. Troubleshooting Chart—Continued

Trouble	Probable cause	Remedy
Starting motor cranks engine slowly	Engine oil too heavy	Change to proper grade oil.
		Recharge or replace battery.
	Battery cell shorted	Replace battery.
	Battery connections corroded, broken, or loose.	Clean and tighten or replace cables.
	Starting motor defective	Replace starting motor.
	Starting switch defective	Replace switch.
Starting motor does not crank engine.	Engine oil too heavy	Change to proper grade oil.
	Starting motor, solenoid or cables defective; loose connections.	Replace defective starting motor or tighten loose connections.
	Starting motor pinion gear jammed in flywheel drive gear.	Replace starting motor.
	Dirty drive mechanism	Clean and lubricate drive mechanism.
	Faulty relay switch	Replace relay switch.
	Ignition fuse blown	Replace fuse.
	Faulty ignition switch	Replace switch.
	Faulty neutral starting switch	Replace switch.
Starting motor operates, but fails to crank engine when switch is engaged.	Starting motor gear not engaging flywheel.	Replace starting motor.
	Starting motor or drive gear defective	Replace starting motor.
No generator output	Regulator defective	Adjust or replace regulator.
	Generator defective	Replace generator.
Low or fluctuating generator output	Loose fan belt	Adjust belt.
	Loose or dirty connections in charging circuit.	Clean and tighten connections.
	Defective generator	Replace generator.
	Defective regulator	Adjust or replace regulator.
Excessive generator output	Defective generator	Replace generator.
	Defective regulator	Adjust or replace regulator.
Generator noisy	Loose pulley or generator mounting	Tighten.
	Defective bearings or armature rubbing on field poles.	Replace generator.
Battery discharged	Battery solution level low	Add distilled water to bring level above plates; inspect for cracked case.
	Short in battery cell	Replace battery.
	Generator not charging	See "No generator output" or "Low or fluctuating generator output" above.
	Loose or dirty connections; broken cables.	Clean and tighten connections; replace cables.
	Excessive use of starting motor	Tune up engine, charge battery.
	Idle battery or excessive use of lights with engine at idle.	Recharge or replace battery. Use lights sparingly.
	Short circuits	Replace defective wiring.
Lights do not light	Switch not fully on	Turn switch on fully.
	Loose or dirty connection, broken wire	Clean and tighten; replace or repair wire or terminal.
	Wiring circuit short-circuited or open	Correct short circuit or replace defective parts.
	Light burned out	Replace light.
	Defective switch	Replace switch.
Lights dim	Loose or dirty connections	Clean and tighten connections.
	Wiring short circuited	Correct short circuit or replace defective parts.
	Defective switch	Replace switch.

Table 2. Troubleshooting Chart—Continued

Trouble	Probable cause	Remedy
Horn sounds continuously	Short circuit in wiring between horn and horn button.	Replace wire.
Horn will not operate	Horn fuse blown	Replace fuse.
	Loose or dirty connection	Clean and tighten connections.
	Open circuit	Repair or replace wire.
	Defective horn relay	Replace relay.
	Defective horn	Replace horn.
Continuous drive axle noise	Unevenly worn tires	Replace tires.
	Improperly adjusted wheel bearing	Adjust bearings.
	Lack of lubricant	Add lubricant.
	Worn parts	Report to proper authority.
Axle noise on drive or on coast only	Parts worn or out of adjustment	Report to proper authority.
Excessive backlash in drive axle	Parts worn or out of adjustment	Report to proper authority.
Complete failure of drive axle	Damaged parts	Report to proper authority.
Steering is difficult	Lack of lubrication	Lubricate.
	Steering system hydraulic oil low	Fill to proper level.
	Power steering cylinder defective	Replace cylinder.
	Power steering pump defective	Replace pump.
	Tight steering gear; misalined wheels	Report to proper authority.
	Bent or misalined parts	Report to proper authority.
Truck wanders or weaves	Improper toe-in, camber, or caster	Report to proper authority.
	Loose drag link connections	Adjust drag links.
	Loose wheel bearings	Adjust wheel bearings.
	Steering gear worn or maladjusted	Report to proper authority.
	Steering gear mounting bolts loose	Tighten mounting bolts.
Shimmy or wobble at low speeds	Loose drag link connections	Adjust drag links.
	Steering gear worn or adjustment too loose.	Report to proper authority.
	Loose wheel bearings	Adjust wheel bearings.
Vehicle pulls to one side	Odd size or new and old tires on opposite wheels.	Match tires.
	Improper toe-in, camber, or caster	Report to proper authority.
	Tight wheel bearings	Adjust. Lubricate wheel bearings.
	Bent steering arm or connection	Report to proper authority.
Brakes drag	Improper pedal adjustment	Adjust brake pedal free travel.
	Brake pedal return spring broken or weak.	Replace spring.
	Brakeshoe anchor pin tight in shoe	Free pin and lubricate lightly.
	Brakeshoe return spring broken or weak.	Replace spring.
	Loose or damaged wheel bearings	Adjust or replace wheel bearings.
	Brake backing plate loose	Tighten plate.
	Grease on linings	Correct grease leakage; clean or install new shoes and lining assemblies.
	Dirt imbedded in lining	Clean lining with wire brush.
	Drums scored or rough	Replace drum and brakeshoe and lining assemblies.
Brake locked	Brake pedal lacking free travel	Adjust pedal free travel.
	Brakes frozen to drums (cold weather).	Break loose by driving vehicle.
Brake noisy or chatters	Brake lining worn	Replace shoe and lining assemblies.
	Grease on linings	Correct leakage; clean or replace shoe and lining assemblies.
	Dirt embedded in linings	Clean lining with wire brush.
	Improper or loose linings	Replace shoe and lining assemblies.
	Brakeshoe or drum distorted	Straighten or replace.

Table 2. Troubleshooting Chart—Continued

Trouble	Probable cause	Remedy
Excessive brake pedal travel	Lining worn	Replace shoe and lining assemblies.
	Pedal free travel improperly adjusted	Adjust free travel.
Excessive brake pedal pressure necessary to actuate brakes.	Insufficient fluid in master cylinder	Fill master cylinder to within ¼ inch of the top.
	Grease on linings; worn or glazed lining.	Correct grease leakage; clean up and replace shoe and lining assemblies.
	Warped brakeshoes or defective brake linings.	Replace shoe and lining assemblies.
	Brakedrum scored or distorted	Repair or replace drum.
Wheel wobble	Wheel bent	Inspect mounting on hub, spindles, and drive axle; replace defective wheel or mounting.
	Wheel loose on hub	Tighten nuts or bolts.
	Wheel bearings not adjusted	Adjust; lubricate wheel bearings.
Hydraulic pump not delivering	Tank oil level low	Add recommended oil.
	Oil intake pipe or suction filter plugged.	Replace filter cartridge; clean intake pipe.
	Air leak in suction line	Tighten connections or replace line.
	Oil viscosity too high	Use oil recommended by lubrication order (fig. 3).
	Clogged intake line or intake filter	Replace filter cartridge; clean intake line.
	Defective pump or pump drive	Report it to proper authority.
Forks do not lift to maximum height	Hydraulic oil level low	Fill sump tank.
Lift or tilt action fails	Loss of oil pressure	Refer to "Hydraulic pump not delivering oil" or "Hydraulic pump not developing adequate pressure" above.
Oil leak at top of lift cylinder assembly.	Defective cylinder	Refer to proper authority.
Oil leak around piston rod at tilt cylinder.	Defective cylinder	Replace cylinder.
With load centered on lift forks, load is lifted unevenly.	Lift chains out of adjustment	Adjust chains.
Truck will not move in either direction.	Parking brake not released	Release brake.
	Transmission oil level low	Fill to proper level.
	Transmission control linkage not properly adjusted.	Readjust linkage.
	Transmission inoperative	Report to proper authority.
Truck will move in one direction only.	Transmission control linkage not adjusted.	Readjust linkage.
	Defective transmission	Report to proper authority.
Truck moves slowly in either direction at wide open throttle.	Oil level low	Fill to correct level.
	Brakes dragging	Refer to "Brakes drag" above.
	Defective transmission	Report to proper authority.
Transmission overheating	Oil level low	Fill to correct level.
	Brakes dragging	Refer to "Brakes drag" above.
	Plugged radiator	Flush radiator.
	Defective transmission	Report to proper authority.

Section IV. ENGINE

15. General

The forklift truck is powered by a Continental four-cylinder, internal combustion, water-cooled, L-head, gasoline engine. A combustible mixture of fuel and air is delivered by the carburetor through the manifold and intake valves to the combustion chambers, where it is ignited by an electrical spark across the electrodes of the spark plugs. The burning mixture of fuel and air causes a heat rise in the combustion chamber. This heat rise causes an expansion of the gases in the combustion chamber that forces the pistons downward in the cylinders. The motion of the pistons causes rotation of the crankshaft. The burned mixture and hot gases are passed through the exhaust valves to the exhaust manifold. Heat left in the engine is transferred to the radiator by the coolant in the cooling system. The exhaust and intake valves are operated by the camshaft which is geared to the crankshaft. Moving parts of the engine are pressure-lubricated by an oil pump driven off the camshaft.

16. Testing

a. Compression Test.

(1) Test the battery (para. 43*b*). If the battery is not fully charged, replace it with a fully charged battery.

(2) Clean around the spark plug ports with compressed air and a cloth dampened in an approved cleaning solvent. Remove the spark plugs.

(3) Hold a compression gage in the front spark plug port. Crank the engine with the starting motor until the highest gage reading is reached. Record the reading. Repeat this process at each of the remaining spark plug ports.

(4) Compression readings above 110 psi,

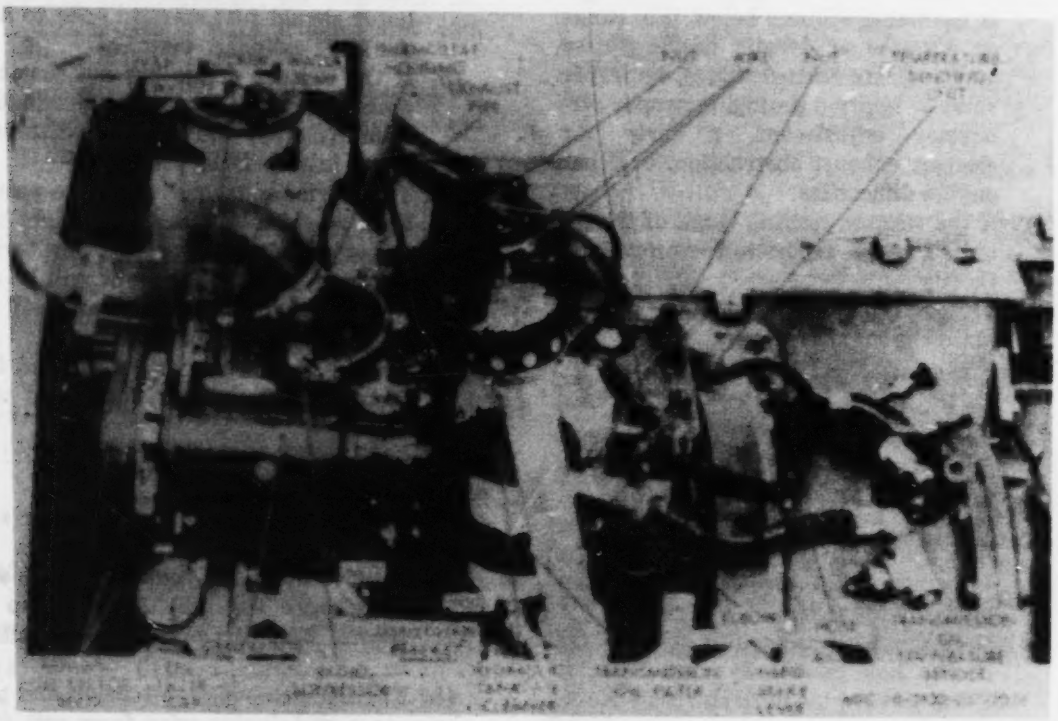

Figure 6. Engine compartment, right side view.

and within 10 psi of each other are normal. If readings are below 110 psi or are irregular, seal the piston with a teaspoon of engine oil poured through the spark plug hole and take new readings. If readings are below 110 psi or if readings at the different ports vary more than 10 psi, the valves or valve seats are burned, the piston rings are worn, or there are other internal engine problems.

(5) If compression fails to fall within the required range, report to the proper authority.

b. Vacuum Test.

(1) Remove the intake manifold pipe plug (6, fig. 13). Install an adapter and connect a vacuum gage to the adapter.

(2) With the engine at operating temperature and running at idle speed, adjust the carburetor idle mixture adjusting screw (fig. 14) for the highest vacuum gage reading.

(3) A vacuum reading of 18 to 22 inches of mercury with a slight needle flutter is normal. Readings below this range or extreme or erratic needle flutter may indicate burned valves, improper valve or ignition timing, improper carburetor adjustment, a dirty air cleaner, exhaust obstruction, or other engine difficulties.

(4) If the vacuum reading is out of the required range, report to the proper authority.

(5) Remove the gage and adapter and replace the manifold plug.

c. Ignition Timing Test and Adjustment.

(1) Set contact gap (para. 40*d*).

(2) Remove the spark plug (#1) nearest the radiator. Place a finger or thumb over the spark plug port (fig. 7). Crank the engine with the starting motor until air is forced out of the No. 1 cylinder past the thumb or finger plugging the port.

(3) Hold a light in a position to light the timing hole on the flywheel housing. Crank the engine until the dead center mark on the flywheel lines up with the pointer in the timing hole (fig. 7).

Figure 7. Ignition timing.

(4) Remove the distributor cap, rotor, and dust cover. With the timing hole pointer on the flywheel dead center mark, the contact points in the distributor should just start to open to fire the No. 1 cylinder.

(5) If the contact points are not just beginning to open, loosen the distributor clamp (fig. 39) and rotate the distributor to just open the points.

(6) To determine exactly when the points open or close, connect a test light between the distributor primary terminal and ground. The light will be off when the points are closed and will go on when the points open.

(7) Replace the timing hole cover and the distributor dust cover, rotor, and cap.

17. Cylinder Head

a. Removal.

(1) Drain coolant from the radiator and engine.

(2) Remove hydraulic tank filler pipe and air cleaner (fig. 39). Cover sump elbow to keep dirt or part from falling in.

(3) Tag and remove high-tension and primary distributor wire from coil (fig. 39).

(4) Remove nuts and lockwashers that secure transmission oil filter and coil bracket to head and block. Position bracket to provide clearance to remove cylinder head.

(5) Loosen generator adjusting strap bolt (fig. 7). Push generator toward engine. Remove belts from generator pulley.

(6) Remove generator adjusting strap bolt, washer, and lockwasher. Remove nuts and washers securing generator to cylinder head.

(7) Remove nuts and washer securing thermostat housing to cylinder head.

(8) Remove the bypass elbow (fig. 6) from the water pump and thermostat elbow; remove the thermostat housing.

(9) Remove nuts and washers (fig. 6) securing engine oil filter to cylinder head studs.

(10) Remove distributor (para. 40*a*).

(11) Tag and disconnect the lead from the water temperature sending unit (fig. 6). Remove the sender.

(12) Remove the nuts and washers securing the cylinder head. Remove the cylinder head and gasket.

b. Cleaning and Inspection.

(1) Remove all carbon from combustion areas with a scraper and wire brush. Clean all remaining residue from the cylinder head with an approved cleaning solvent. Dry with clean, dry compressed air.

(2) Clean the top of the cylinder block with a scraper and a cloth dampened in an approved cleaning solvent. Be very careful not to get dirt in the cylinders or water jacket.

(3) Inspect the cylinder head for cracks, corrosion, damaged threads, plugged water ports, or other defects.

(4) Check flatness lengthwise with a straightedge and feeler gage (fig. 8). The maximum permissible low spot is 0.004 inch in the center, gradually decreasing toward the ends. Check flatness lengthwise at each edge and in the middle of the head.

(5) Check flatness crosswise with a straightedge and a feeler gage (fig. 9). The maximum permissible low spot is 0.003 inch in localized areas. Check flatness crosswise at each end and between each combustion chamber.

(6) Inspect cylinder head studs for looseness or damaged threads.

(7) Replace the gasket hoses and defective parts.

c. Installation. Install head and other parts in reverse order of removal (para. 21*a*) and retime engine if necessary (para. 16*c*).

18. Valve Adjustment

a. Operate engine until it reaches operating temperature.

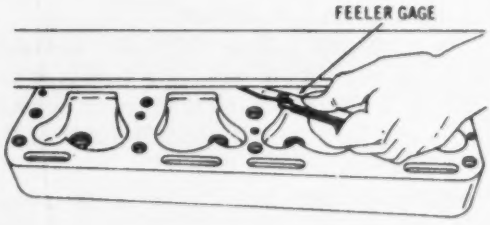

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Figure 8. Checking cylinder head flatness lengthwise.

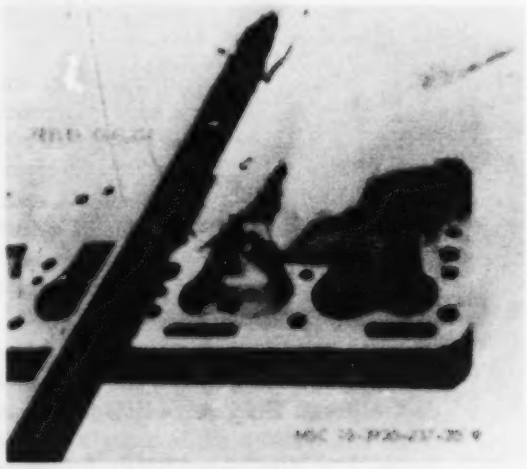

Figure 9. Checking cylinder head flatness crosswise.

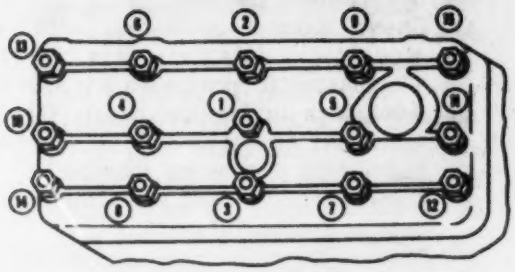

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Figure 10. Cylinder head nut tightening sequence.

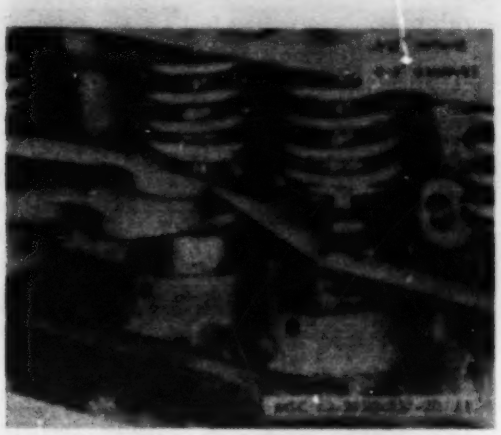


Figure 11. Valve adjustment.

b. Remove the valve chamber cover (fig. 14) nuts, and washers. Remove the valve chamber cover and the ventilation unit and the gasket.

c. With the engine at operating temperature and running at idle speed, set the valves for 0.012-inch clearance as follows:

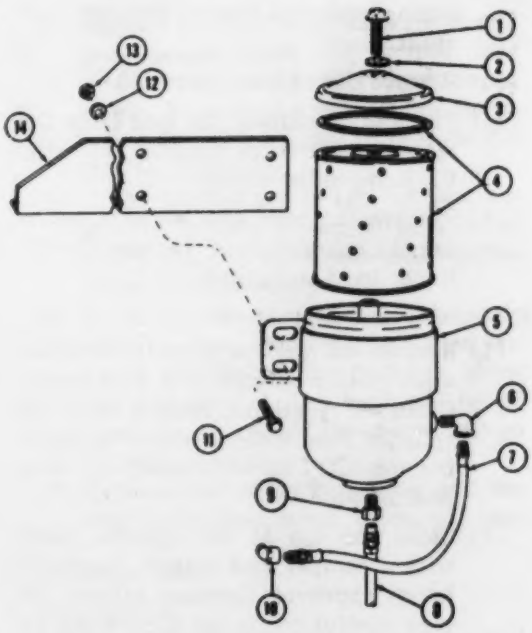
(1) Check for proper 0.012-inch clearance by alternately passing a 0.01-inch and a 0.013-inch flat feeler gage between the head of the adjusting screw and valve stem (fig. 11).

(2) If a 0.011-inch feeler gage moves freely back and forth in the gap when the valve is not being lifted and 0.013-inch feeler gage binds at all times, the clearance requires no adjustment.

(3) If a 0.011-inch feeler gage is gripped at all times, the clearance is insufficient.

(4) Hold valve lifter with an open end wrench while using a second wrench to turn adjusting screw one-quarter to one-half turn clockwise. Repeat clearance check and adjustment until proper clearance is obtained. The adjustable-type valve lifters have self-locking adjusting screws that require no locknuts.

(5) If 0.013-inch feeler moves freely when valve is not being lifted, the clearance is too great. Hold valve lifter with an open end wrench while using a second wrench to turn valve lifter adjusting screw counterlockwise one-quarter to



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1	Screw	8	Hose
2	Washer	9	Fitting
3	Cover	10	Elbow
4	Cartridge and gasket	11	Bolt
5	Body	12	Lockwasher
6	Elbow	13	Nut
7	Hose	14	Bracket

Figure 12. Engine oil filter, exploded view.

one-half turn. Repeat the clearance check and adjustment until proper clearance is obtained.

(6) Repeat clearance check and adjustment for remaining intake valves.

(7) Check exhaust valve clearance for proper 0.012-inch clearance by alternately passing a 0.011-and 0.013-inch flat feeler gage between the head of the adjusting screw and the valve stem cap.

(8) If necessary, adjust the exhaust valve clearance in the same manner as the intake valves described in (1) through (5) above.

(9) Install the valve chamber cover using a new gasket. Secure with two cover nuts and gaskets.

19. Engine Oil Filter

a. Cartridge Replacement.

(1) Engine oil filter cartridge replacement must coincide with engine oil change (fig. 3). Remove the screw (1, fig. 12) and washer (2) that secure the cover (3) to the body (5). Remove the cover and the cartridge and gasket (4).

(2) Remove dirty oil from the body with a syringe. Clean the interior of the body with a clean, lint free cloth.

(3) Install a new cartridge in the body. Position the gasket in the cover. Place the cover and gasket on the body; secure with the screws and nonmetallic washer.

(4) Operate the engine at idle speed for about 1 minute. Check the engine oil level. Add more oil if necessary. Operate the engine at governed speed for 10 minutes. Check for oil leaks around the filter cover.

b. Filter Removal.

(1) Disconnect the oil hoses (7 and 8, fig. 12) from the elbow (6) and fitting (9). Remove the elbow and fitting from the body (5).

(2) Remove the bolts (11), nuts (13), and lockwashers (12) that secure the filter to the mounting bracket. Remove the filter.

c. Filter Installation. Install in reverse procedure of *b* above.

20. Manifold

a. Removal.

(1) Remove the carburetor (para. 23*b*).

(2) Remove the exhaust pipe and flange from the manifold (para. 30*a*).

(3) Remove the air intake hose from the air cleaner.

(4) Remove the nuts (5, fig. 13) and washers (4 and 7) that secure the manifold (2) to the cylinder block; remove the manifold and gasket (1).

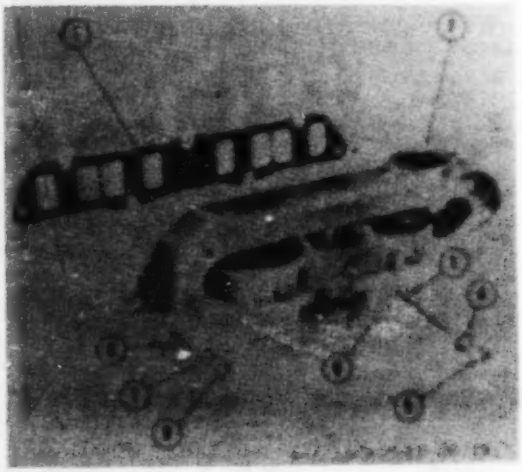
b. Cleaning and Inspection.

(1) Clean dirt from the manifold with a wire brush; then clean with a cloth dampened in an approved cleaning solvent.

(2) Inspect the manifold for cracks, warping, damaged sealing surfaces, corroded areas, damaged threads, or other defects.

(3) Inspect for loose or damaged studs.

(4) Replace the gasket; replace other parts if defective.



1 Gasket
2 Manifold
3 Stud
4 Washer
5 Nut
6 Pipe plug
7 Washer
8 Stud
9 Nut

Figure 13. Manifold and gasket, exploded view.

c. Installation. Install in reverse procedure of *a* above.

21. Valve Chamber Cover and Crankcase Ventilation Tube

a. Removal. Remove the valve chamber cover nuts (fig. 14), valve chamber cover, crankcase ventilation unit, and gasket from the cylinder block.

b. Cleaning and Inspection.

(1) Clean the valve chamber cover and crankcase ventilation tube in an approved cleaning solvent; dry with clean, dry compressed air.

(2) Inspect the valve chamber cover for warping, dents, damaged sealing surfaces, or other defects.

(3) Inspect the crankcase ventilation tube for obstructions, dents, looseness, or other defects.

(4) Replace the gasket, replace the valve chamber cover and crankcase ventilation tube if defective.

c. Installation. Install in reverse procedure of *a* above.

Section V. FUEL SYSTEM

22. General

The fuel system consists of the fuel tank, fuel filter, lines, fuel pump, carburetor, accelerator pedal, and linkage, governor, exhaust pipe, and muffler. Fuel is drawn from the fuel tank, through the fuel filter, by the fuel pump. From the fuel pump, fuel goes to the carburetor where it is combined with air to form a mixture that is combustible in the engine. Exhaust gases from the engine are carried to the rear of the forklift truck by the exhaust pipe. Exhaust noise of the running engine is minimized by the muffler. The amount of fuel fed to the engine is controlled by the accelerator pedal and linkage. The governor limits the maximum speed of the engine.

23. Carburetor

a. Adjustment.

(1) Disconnect hour meter wire terminal from connector; remove fuel cap, grommet, and two bolts, and washers securing fuel filter well; remove well.

(2) Remove the pipe plug (6, fig. 13) from the intake manifold; install an adapter in the pipe plug hole; connect a vacuum gage to the adapter.

(3) Connect a tachometer to the engine.

(4) Run the engine at fast idle until it is at operating temperature.

(5) Loosen the choke adjusting screw (fig. 14); push the choke control knob all the way in; then pull it out about 1/16 inch. Push the choke control lever as far as possible toward the rear of the forklift truck; secure the choke adjusting screw against the choke wire.

(6) Set the idle speed adjusting screw for an engine speed of 450 to 500 rpm.

(7) Set the idle mixture adjusting screw to obtain the highest reading possible on the vacuum gage.

(8) If engine speed is not between 450 and 500 rpm, reset the engine idle speed as directed in (6) above.

(9) If any idle speed readjustment is necessary, readjust the idle mixture as directed in (7) above.

b. Removal.

(1) Disconnect wire and remove bracket (*a* above).

(2) Loosen hose clamp, at carburetor, and disconnect hose.

(3) Loosen the choke adjusting screw (fig. 14) and the choke cable bracket screw. Pull the choke cable from the choke bracket and control lever.

(4) Remove the clip that secures the linkage to the throttle control lever; disconnect the linkage.

(5) Disconnect the fuel line from the elbow. Remove the elbow from the carburetor.

(6) Remove the nuts that secure the carburetor to the manifold; remove the carburetor and gasket.

c. Installation. Install in reverse procedure of *b* above.

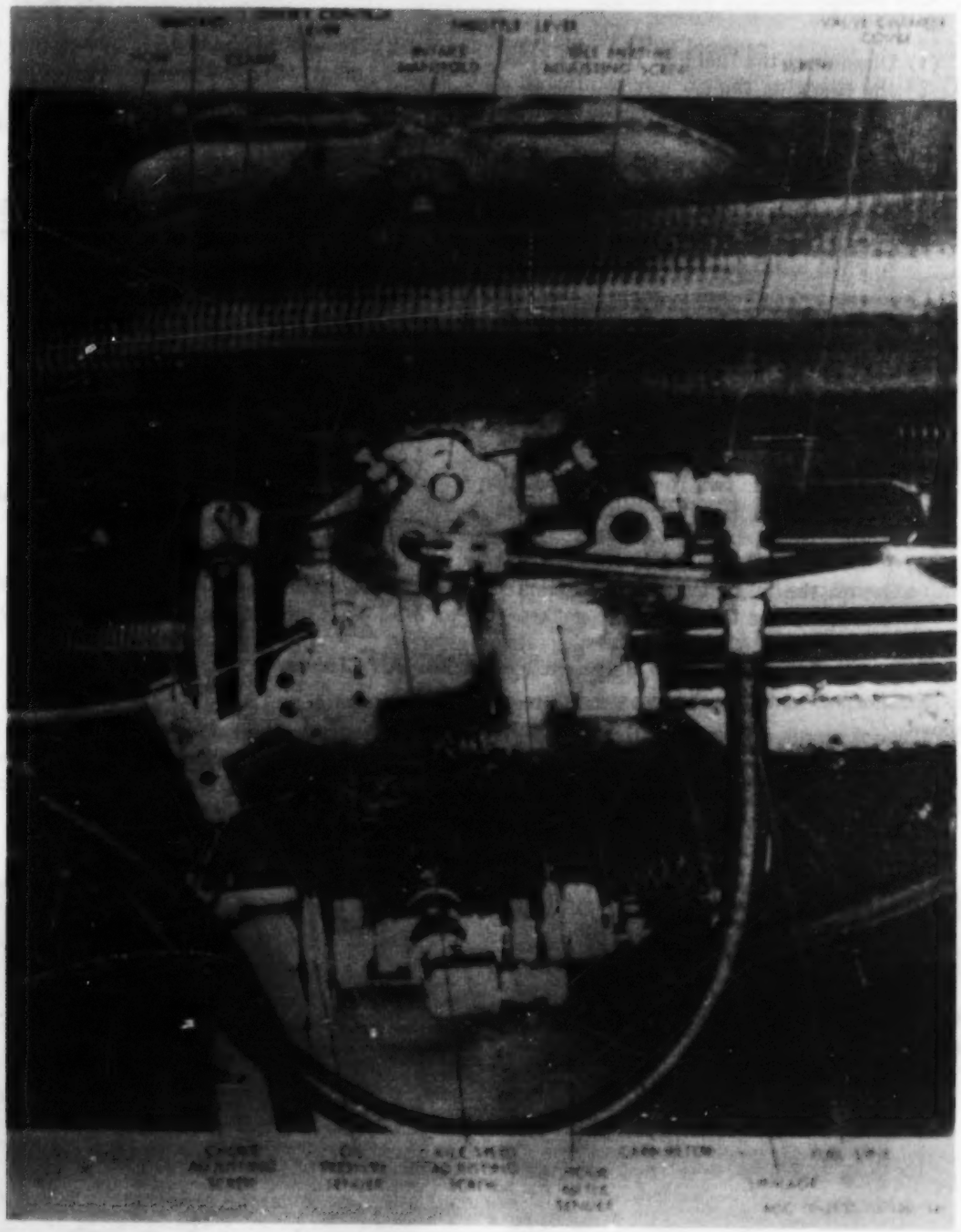


Figure 14. Carburetor.

24. Fuel Pump.

a. Testing.

(1) Disconnect the fuel line (fig. 14) from the elbow on the carburetor. Install a tee fitting between the elbow and the fuel line. Connect a 0- to 5-psi pressure gage to the tee fitting.

(2) Connect a tachometer to the engine.

(3) Operate the engine at 1800 rpm. If the gage does not indicate between 1¼ and 2¼ psi with the gage held 16 inches above the fuel pump, inspect the fuel lines and the filter for obstructions. If the filter and lines are unobstructed, replace the fuel pump.

(4) Remove the tee fitting and tachometer. Connect the fuel line to the elbow.

b. Removal.

(1) Disconnect the two fuel lines (figs. 14 and 16) from the elbows. Remove fuel lines from fuel pump (fig. 15).

(2) Remove two nuts and lockwashers that secure the fuel pump to the cylinder block; remove the fuel pump gasket.

(3) Remove the elbows from the fuel pump. Replace pump if defective.

c. Installation. Install in reverse procedure of *b* above.

25. Fuel Filter

a. Filter Element Replacement.

(1) Close the fuel shutoff valve (fig. 16). Loosen the nut on the bail (6, fig. 17) of the fuel filter.

(2) Remove the bowl (5), gasket (4), element (3), and gasket (2) from the cover (1).

(3) Clean the bowl and cover with a cloth dampened in an approved cleaning solvent.

(4) Install new gaskets and a new filter element on the cover. Position the bowl and bail; tighten the bail nut.

(5) Check for leaks around the bowl gasket.

b. Removal.

(1) Disconnect filter to fuel pump line (fig. 15).

(2) Disconnect elbow from fuel tank adapter; remove filter.

(3) Remove coupling from elbow and shutoff valve. Remove shutoff valve and elbow from filter.

c. Installation. Install in reverse procedure of *b* above. Connect the fuel line to the cover

26. Air Cleaner

a. Cleaning.

(1) Loosen the clamp screw (fig. 34) that secures the clamp and cup to the air cleaner body. Remove the cup from the body.

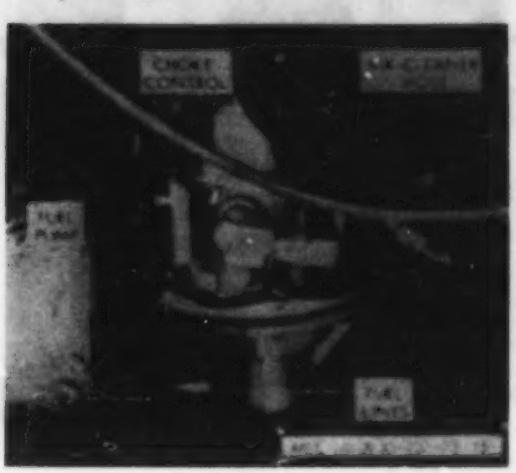
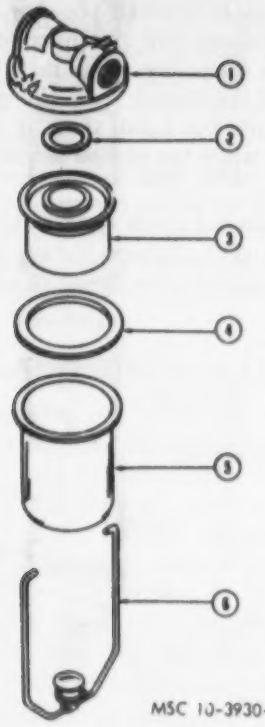


Figure 15. Fuel pump.

Figure 16. Fuel filter installation.



1 Cover
2 Gasket
3 Element
4 Gasket
5 Bowl
6 Bail

Figure 17. Fuel filter, exploded view.

(2) Dump used oil from the cup. Wash the cup in an approved cleaning solvent; dry with clean, dry compressed air.

(3) Fill the cup to the level line with oil of the same viscosity being used in the engines (fig. 3).

(4) Position the cup under the body; secure with the clamp and clamp screw.

b. Removal.

(1) Loosen the clamp (fig. 34) that secures the hose to the air cleaner body; pull the hose from the body.

(2) Remove the two bolts, nuts, lockwashers, and plain washers that secure the body to the bracket; remove the assembled body, clamp, and cup.

c. Installation.

(1) Install in reverse procedure of *b* above.

(2) Fill the oilcup to the level line as described in *a* (3) above.

27. Fuel Tank Cleaning

a. Remove the assembled cap (1, fig. 18), strainer (2) and grommet (4) from the fuel tank (6) which is built into the truck frame. Remove the preformed packing (3).

b. Remove the plug (7) from the tank and allow the tank to drain. Flush the tank with gasoline.

c. Clean the cap and strainer in an approved cleaning solvent; dry with clean, dry compressed air.

d. Inspect the strainer for distortion, dents, or other damage. Inspect the preformed packing and grommet for cuts, cracks, deterioration, or other damage. Replace defective parts.

e. Install the plug in the tank.

f. Install the grommet on the tank neck.

g. Screw the strainer into the cap. Position the preformed packing on the strainer. Screw the assembled strainer and cap into the tank.

28. Governor Adjustment

a. Time the engine (para. 16*c*) and adjust the carburetor (para. 23*a*).

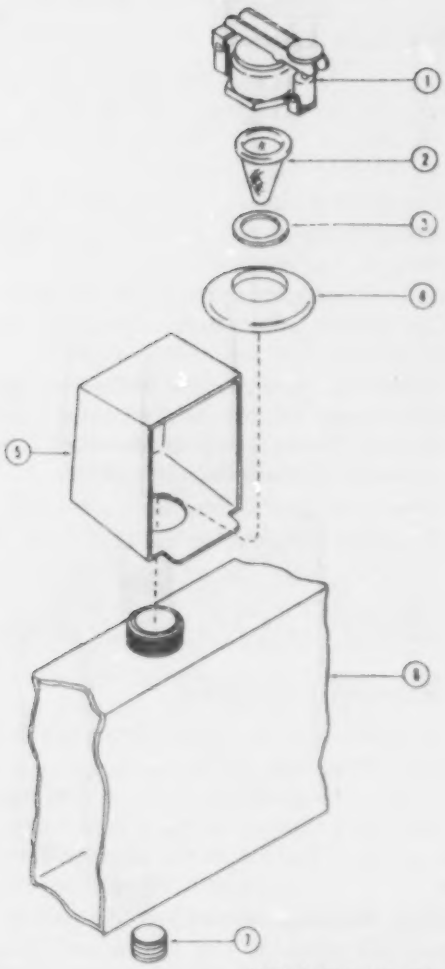
b. Loosen the governor surge screw locknut and back out the surge screw a few turns. The surge screw is located in the edge of the gear cover.

c. With the engine stopped, disconnect the slip tube rod assembly (fig. 19) by removing the cotter pin and pin that connects the clevis to the governor arm.

d. Pull the slip rod from the tube of the adjacent rod. Clean the rod and lubricate it with graphite grease (fig. 19).

e. With the slip tube rod removed, the governor arm will move toward the front of the forklift truck. The clearance between the carburetor full-open throttle stop on the throttle lever and the stop pin must be 3/32 inch (fig. 19) while the governor arm is in the forward position. If the clearance is not 3/32 inch, adjust the length of the carburetor throttle linkage by rotating the clevis.

f. Push the governor arm toward the rear of the forklift truck until the carburetor idle speed



1 Cap
2 Strainer
3 Preformed packing
4 Grommet
5 Guard
6 Fuel tank
7 Plug

Figure 18. Fuel tank cap and plug, exploded view.

adjusting screw (fig. 19) contacts the adjusting screw stop. Screw the governor surge screw in until it contacts the governor shaft lever within the governor. Secure the surge screw locknut.

Note. Tighten the governor surge screw until it just contacts the shaft lever. If the surge screw is overtightened, the carburetor idle speed adjusting screw will be forced off its seat.

g. Connect an electric tachometer to the engine.

h. Run the engine at one-half speed with the accelerator pedal linkage still disconnected until the engine reaches operating temperature. Adjust the tension of the spring with the adjusting bolt and locknuts for a full throttle engine speed of 2300 rpm while the engine is operating under no load.

i. Adjust slip tube rod clevis to provide clearance between rod and slip tube as shown on (fig. 19). Connect the accelerator pedal linkage to

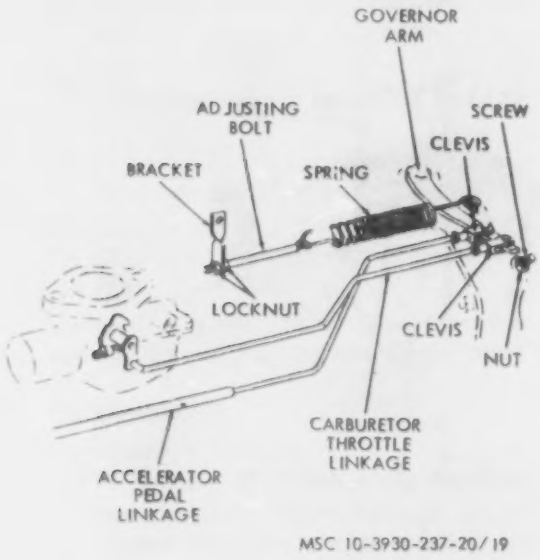


Figure 19. Governor adjustment.

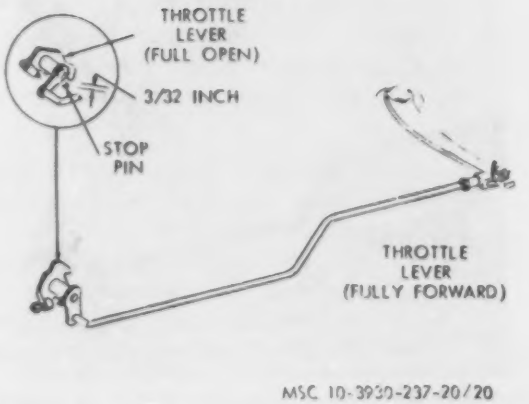


Figure 20. Carburetor open throttle stop clearance.

the governor arm, depress the accelerator pedal as far as it will go. The clearance between the carburetor full-open throttle stop and the stop pin must be 3/32 inch (fig. 19). If the clearance is not 3/32 inch, adjust the accelerator pedal linkage (fig. 19) by rotating the clevis.

j. Check engine rpm under no load with the throttle depressed as far as it will go. If maximum rpm is not between 2300 and 2400 rpm, check for binding linkage, a defective tube, or other problems with the accelerator linkage; repair as necessary.

29. Accelerator Pedal and Linkage

a. Removal.

(1) Remove the cotter pin (2, fig. 21) and pin (1) that connect the clevis (3) to the governor arm. Loosen the locknut (4); remove the clevis and locknut from the rod (5); pull the rod (5) from rod (6).

(2) Remove the cotter pin (11) that secures the rod (6) to the bellcrank (12); remove the rod.

(3) Remove the cotter pin (41) and pin (42) that connects the clevis (40) to the governor arm. Remove the clip (37) that secures the rod (38) to the carburetor throttle lever; remove the rod.

(4) If it is necessary to replace the rod (38) or clevis (3), loosen the locknut (4) and remove the clevis and locknut from the rod.

Note. If the clevis (3) is removed from the rod (38), the governor will have to be readjusted (para. 28).

(5) Remove the spring (36) from the bellcrank (12). Remove the bolt (34) and nut (35) that secure the bellcrank (12) to the bracket; remove the bellcrank.

(6) Remove the cotter pins (33 and 14) that secure the rod (13) to the bellcrank and to the cross shaft (15); remove the rod.

(7) Remove the bolt (10) and lockwashers (9) and the nut (7) that secure the bracket (8) to the frame; remove the bracket.

(8) Remove the cotter pin (30) and pin (31) that secure the pedal (32) to the bracket (28); remove the pedal.

(9) Remove the bolts (29), lockwashers (27), and nuts (26), that secure the bracket (28) to the floorboard; remove the bracket. Remove the nuts (23 and 25) and lockwashers (24) that secure the accelerator stop bolt (22) to the floorboard; remove the bolt.

(10) Remove the bolts (17) and lockwasher (16) that secure the cross-shaft brackets to the floorboard; remove the cross-shaft.

(11) Remove the nut (21) and lockwasher (20) that secure the bolt (18) and roller (19) to the cross-shaft; remove the bolt and roller.

b. Cleaning and Inspection.

(1) Clean all metal parts in an approved solvent.

(2) Inspect the rods, brackets, clevises, pins, bellcrank, and roller for wear, cracks, distortion, or other damage.

(3) Inspect the spring for cracks, distortion, and loss of tension.

(4) Make sure the rod (5) slides freely in the portion of the rod (6). Lubricate the interior of the tube with graphite grease (fig. 3).

(5) Replace all damaged or defective parts.

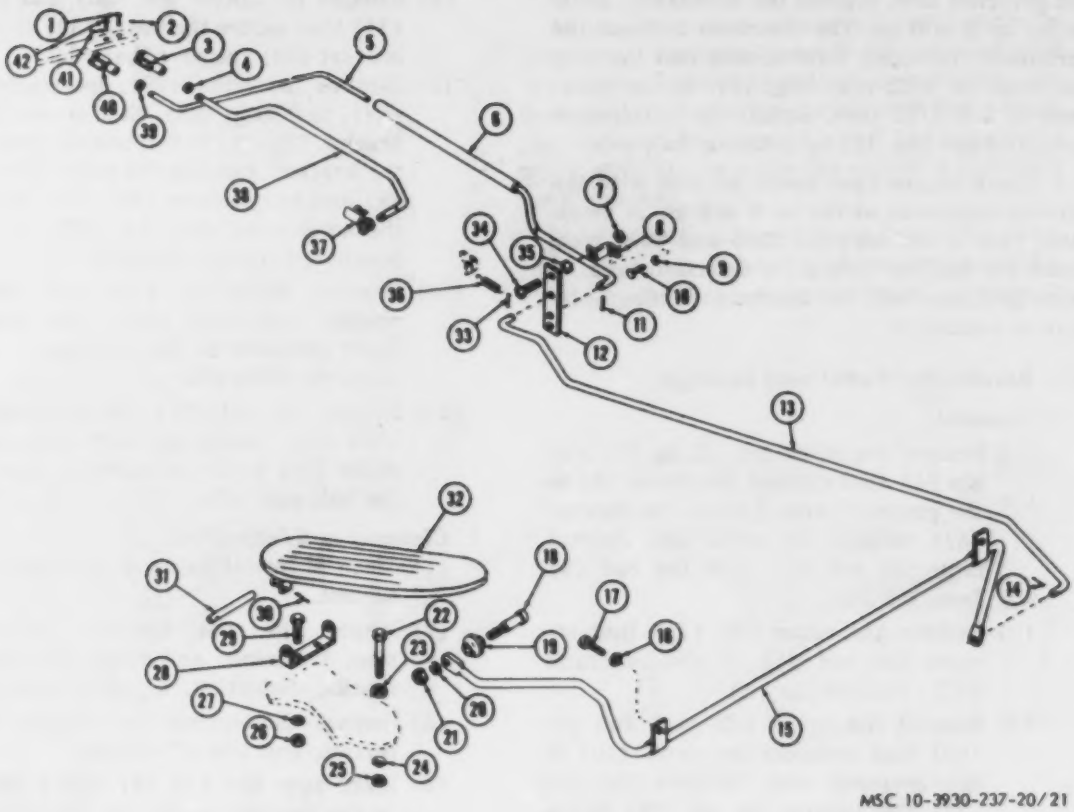
c. Installation. Install in reverse procedure of *a* above.

d. Adjustment.

(1) If the clevis (3, fig. 21) was removed from the rod (38), adjust the governor and linkage (para. 28).

(2) If the clevis (3) was not removed from the rod (38), adjust the clevis (3) so that the governor arm travels its full length when the accelerator pedal is depressed. Secure the locknut (4). Depress the accelerator pedal as far as possible. Adjust the accelerator stop bolt (22) with the locknuts (23 and 25) so that the head of the bolt (22) supports the pedal.

Note. Do not raise the head of the bolts so high that the travel of the governor arm is limited.



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1	Clevis pin	12	Bellcrank	23	Nut	33	Cotter pin
2	Cotter pin	13	Rod	24	Lockwasher	34	Bolt
3	Clevis	14	Cotter pin	25	Nut	35	Nut
4	Locknut	15	Rod	26	Nut	36	Spring
5	Rod	16	Lockwasher	27	Lockwasher	37	Clip
6	Rod	17	Bolt	28	Bracket	38	Rod
7	Nut	18	Shoulder bolt	29	Bolt	39	Nut
8	Bracket	19	Roller	30	Cotter pin	40	Clevis
9	Lockwasher	20	Washer	31	Pin	41	Cotter pin
10	Bolt	21	Nut	32	Pedal	42	Clevis pin
11	Cotter pin	22	Accelerator stop bolt				

Figure 21. Accelerator linkage, exploded view.

Section VI. EXHAUST SYSTEM

30. Exhaust Pipe and Muffler

a. Removal.

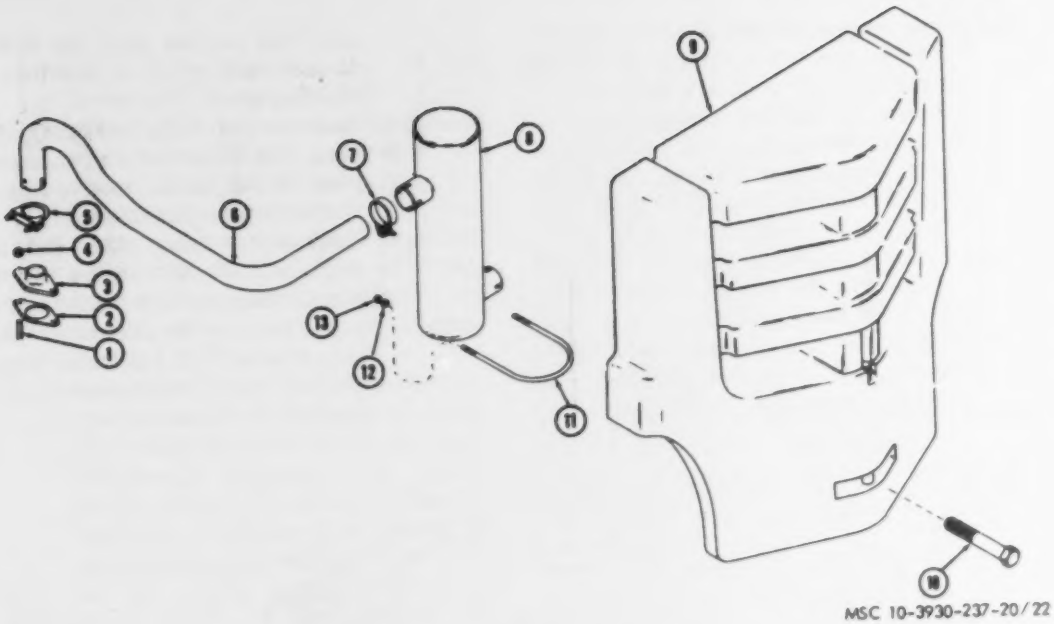
(1) Remove the bolt (10, fig. 22) that secures the counterweight (9) to the frame; lift the counterweight from the frame.

(2) Loosen the clamp (7) that secures the exhaust pipe (6) to the muffler (8); separate the exhaust pipe and muffler.

(3) Remove the nuts (13), lockwashers (12), and clamp (11) that secures the muffler to the bracket; remove the muffler.

(4) Loosen the clamp (5) that secures the exhaust pipe (6) to the flange (3); remove the exhaust pipe.

(5) Remove the nuts (4) that secure the flange to the manifold; remove the flange (3) and gasket (2).



1 Stud	5 Clamp	8 Muffler	11 Clamp
2 Gasket	6 Exhaust pipe	9 Counterweight	12 Lockwasher
3 Flange	7 Clamp	10 Bolt	13 Nut
4 Nut			

Figure 22. Exhaust system and counterweight, exploded view.

b. Cleaning and Inspection.

(1) Clean the muffler and exhaust pipes with a wire brush.

(2) Inspect the muffler for corrosion, cracks, dents, separated seams, or other damage.

(3) Inspect the exhaust pipes, flange, and clamps for corrosion, cracks, dents, distortion, or other damage.

(4) Replace damaged or defective parts.

c. Installation. Install in reverse procedure of *a* above.

Section VII. COOLING SYSTEM

31. General

The cooling system cools the engine, torque converters, and transmission. The system consists of the radiator, thermostat, fan, water pump, and hoses. Engine coolant is circulated by the water pump through the engine to the radiator where it is cooled. The radiator is cooled by the flow of air circulated by the fan. When the engine is below operating temperature, the thermostat closes, preventing the circulation of coolant. Torque converter and transmission oil is transferred through hoses to the lower part of the radiator where it is cooled.

32. Radiator

a. Cleaning.

(1) Clean foreign matter from the cooling fins by forcing compressed air through the radiator from the counterweight toward the engine.

(2) Flush the cooling system with a chemical cleaner in accordance with current directives. After flushing, fill the cooling system with antifreeze (table 1) containing a rust inhibitor or water and rust inhibitor in accordance with current directives.

(3) If the cooling system is badly clogged with rust and scale, reverse flow-flush the radiator and engine as follows:

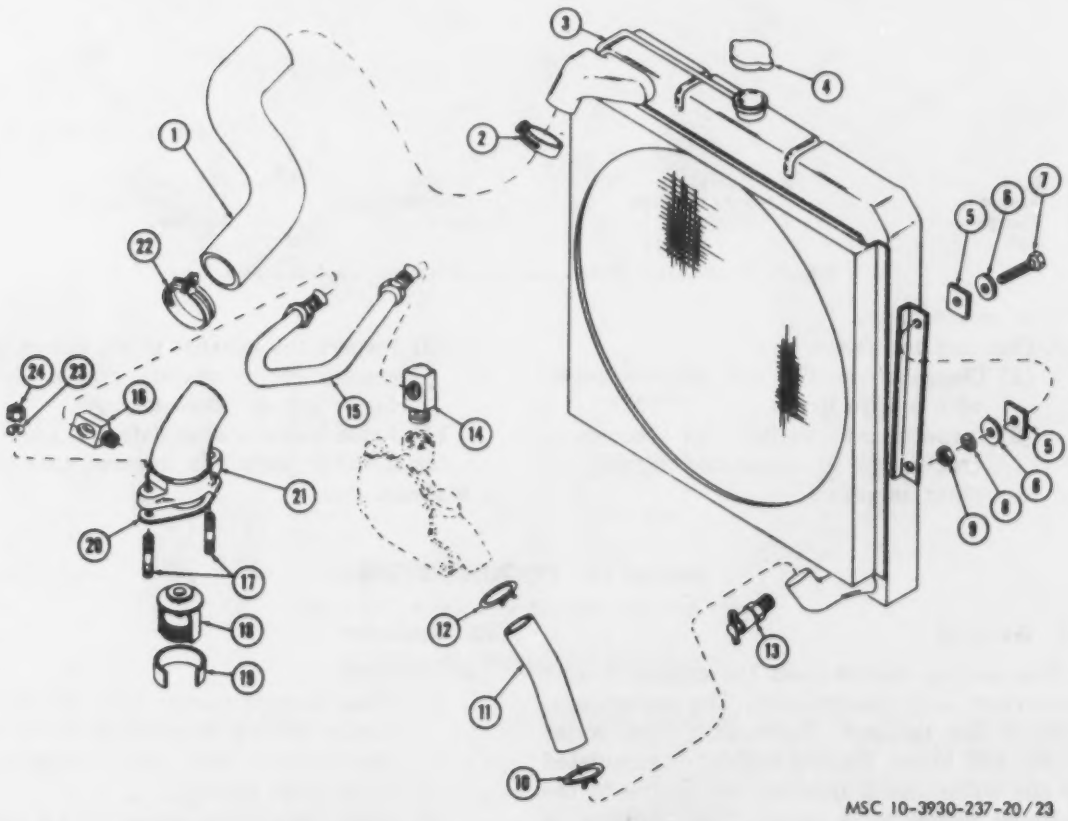
(*a*) Drain the cooling system.

(*b*) Loosen the clamps (12 and 22, fig. 23); disconnect the hose (1) from the thermostat housing (21) and the hose (11) from the water pump.

(*c*) Connect the flushing gun to the hose (11). Fill the radiator with water. Shut off the water supply and blow the water out of the radiator with air. Apply air pressure gradually to prevent damage to the radiator. Repeat this process until the flushing stream runs clear. Disconnect the flushing gun.

(*d*) Remove the tube assembly (15) from the elbow on the thermostat housing (21) and water pump. Install a plug in the elbow (16).

(*e*) Remove the nuts (24) and lockwashers (23) that secure the thermostat housing (21) to the cylinder head; remove the thermostat housing; thermostat (18) and adapter (19). Reinstall the thermostat housing; secure the nuts (24).



1	Hose	7	Bolt	13	Drain cock	19	Adapter
2	Clamp	8	Lockwasher	14	Elbow	20	Gasket
3	Radiator	9	Nut	15	Tube assembly	21	Thermostat housing
4	Cap	10	Clamp	16	Elbow	22	Clamp
5	Pad	11	Hose	17	Stud	23	Lockwasher
6	Washer	12	Clamp	18	Thermostat	24	Nut

Figure 23. Cooling system, exploded view.

(*f*) Connect the flushing gun to the thermostat housing (fig. 23). Completely fill the engine water jacket with water. Hold a hand over the water pump outlet to be sure the water jacket is completely full. Shut off the water supply. Blow the water out of the water jacket with air. Repeat this procedure until the flushing stream runs clean. Disconnect the flushing gun.

(*g*) Install the thermostat in the thermostat housing; install the tube assembly, install the hoses on the radiator, thermostat housing, and water pump; secure with clamps. Close the engine and radiator drain cocks. In accordance with current directives, fill the cooling system with antifreeze (table 1) containing a rust inhibitor or water and rust inhibitor.

b. Removal.

(1) Remove the counterweight and muffler (para. 30*a*).

(2) Drain the radiator by opening the drain cock (13) and removing the radiator cap (4).

(3) Loosen the clamps (2 and 10) that secure the hoses (1 and 11) to the radiator (3); disconnect the hoses.

(4) Place a drain pan under the radiator. Disconnect the transmission oil lines from the radiator and drain oil from the lines and radiator.

(5) Remove the bolts (7), washers (6), lockwashers (8), and nuts (9) that secure the radiator to the frame; remove the radiator and pads (5).

c. Inspection.

(1) Inspect the radiator core and tanks for cracks, dents, distortion, or other damage.

(2) Inspect the solder joints between the tanks and core for evidence of leaks or other damage.

(3) Replace the radiator if defective.

d. Installation. Install in reverse procedure of *b* above.

(1) Close the radiator drain cock (13). In accordance with current directives, fill the cooling system with antifreeze (table 1) containing a rust inhibitor or with water and rust inhibitor.

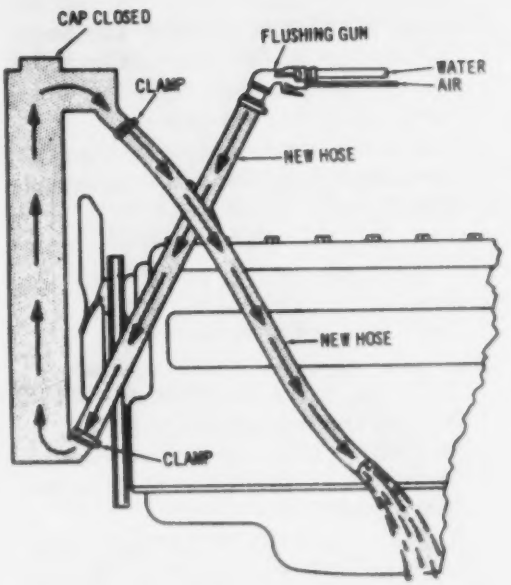


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Figure 24. Reverse flow flushing radiator.

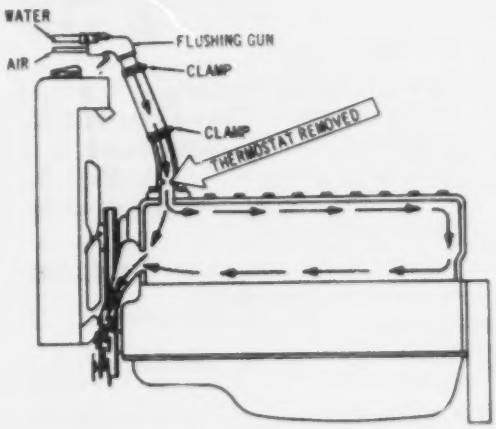

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Figure 25. Reverse flow flushing engine.

(2) Run the engine until it reaches operating temperature. Check the cooling system for leaks. Run the forklift truck a few feet forward and backward under its own power. Check the transmission oil level; add oil if necessary.

(3) Install the counterweight and muffler in reverse procedure of paragraph 30*a* above.

33. Thermostat

a. Removal.

(1) Drain the cooling system.

(2) Loosen the clamp (22), the hose (1) from the thermostat housing (21). Remove the tube assembly (15) from the elbow (16) on the thermostat housing, then the elbow (14) on the water pump.

(3) Remove the nuts (24) and lockwashers (23) that secure the thermostat housing to the cylinder head; remove the thermostat housing, gasket (20), thermostat (18), and adapter (19).

b. Inspection and Testing.

(1) Inspect the thermostat for cracks, distortion, scale or dirt deposits, or other physical damage.

(2) Suspend the thermostat in a pan of water on a stove. Place a thermometer capable of reading temperatures up to the boiling point in the pan. Heat the water. The thermostat must open between 150° to 185°F.

(3) Replace the gasket, and, if defective, replace the thermostat.

c. Installation.

(1) Install in reverse procedure of *a* above.

(2) Fill the cooling system with antifreeze (table 1) containing a rust inhibitor or with water and rust inhibitor.

34. Water Pump

a. Removal.

(1) Remove the radiator, (para. 32*b*), counterweight, and muffler (para. 30 *a*).

(2) Loosen generator adjusting strap bolt (fig. 26); push generator toward engine; remove the fan and generator bolts.

(3) Loosen the clamp (12, fig. 23) that secures the hose (11) to the water pump; remove the hose; remove the tube assembly (15) from the water pump elbow (14) and the thermostat housing elbow (16).

(4) Remove the bolts and lockwashers that secure the water pump to the cylinder block; remove the water pump and gasket.

b. Cleaning and Inspection.

(1) Clean the exterior of the water pump with a cloth dampened in an approved cleaning solvent.

(2) Inspect the water pump for cracks, evidence of leaks, shaft play, or other defects.

(3) Inspect the pulley for cracks, wear, distortion, or other defects.

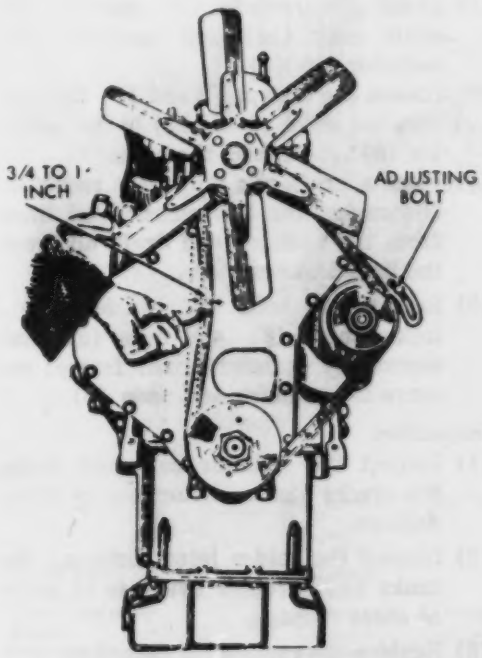

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Figure 26. Checking fan and generator belt tension.

(4) Replace the gasket; replace the water pump if defective.

c. Installation. Install in reverse procedure of *a* above.

35. Fan and Generator Belts

a. Removal.

(1) Loosen the generator adjusting strap bolts (fig. 26).

(2) Push the generator toward the engine; slip the generator belts off the generator pulley and remove them from the fan and crankshaft pulleys.

b. Installation. Install in reverse procedure of *a* above.

c. Adjustment.

(1) Pull the generator away from the engine until there is tension on the belts; temporarily tighten the generator adjusting strap screw (fig. 26).

(2) Check the belt deflection on the span between the fan pulley and the engine crankshaft drive pulley (fig. 26). Change the position of the generator to allow ¾ to 1 inch deflection of the belt with firm thumb pressure.

(3) Tighten the generator mounting bolts and nuts and the adjusting strap screw.

Section VIII. ELECTRICAL SYSTEM

36. General

The electrical wiring diagram for the forklift truck is shown in figure 27. Power to operate the starting motor is supplied by a 12-volt battery. When the starter switch is closed, the starting relay is energized. This, in turn, closes the circuit that energizes the starter solenoid. The starter solenoid then completes a circuit from the battery to the starting motor to crank the engine. When the engine is running, it turns the generator which recharges the battery. An ammeter on the instrument panel indicates the rate of charge. The headlight and taillight are operated by the light switch mounted on the instrument panel. The stoplight is operated by a pressure switch mounted on the brake master cylinder. This circuit closes only when the starter and ignition switch is in the run position.

37. Generator

a. Testing.

(1) Connect a jumper from the generator field post (post farthest from engine) to ground. Connect dc voltmeter from the generator armature post (post nearest engine) to ground.

(2) With the generator operating at approximately 1970 rpm, generator output shall be 14 volts. Use a hand tachometer to determine generator rpm.

Caution: Do not overspeed the engine during this test. Very high voltages and damage to the electrical system could result.

(3) Disconnect the voltmeter and jumper.

b. Removal.

(1) Tag electrical leads to the generator; disconnect the leads.

(2) Loosen the generator and fan belt adjusting bolt and the generator mounting bolts and nuts. Push the generator toward the engine to loosen the generator and fan belts; slip the belts off the generator pulley.

(3) Remove the generator and fan belt adjusting screw, lockwasher, and lockwasher; and the generator mounting bolts, nuts, and lockwashers; remove the generator.

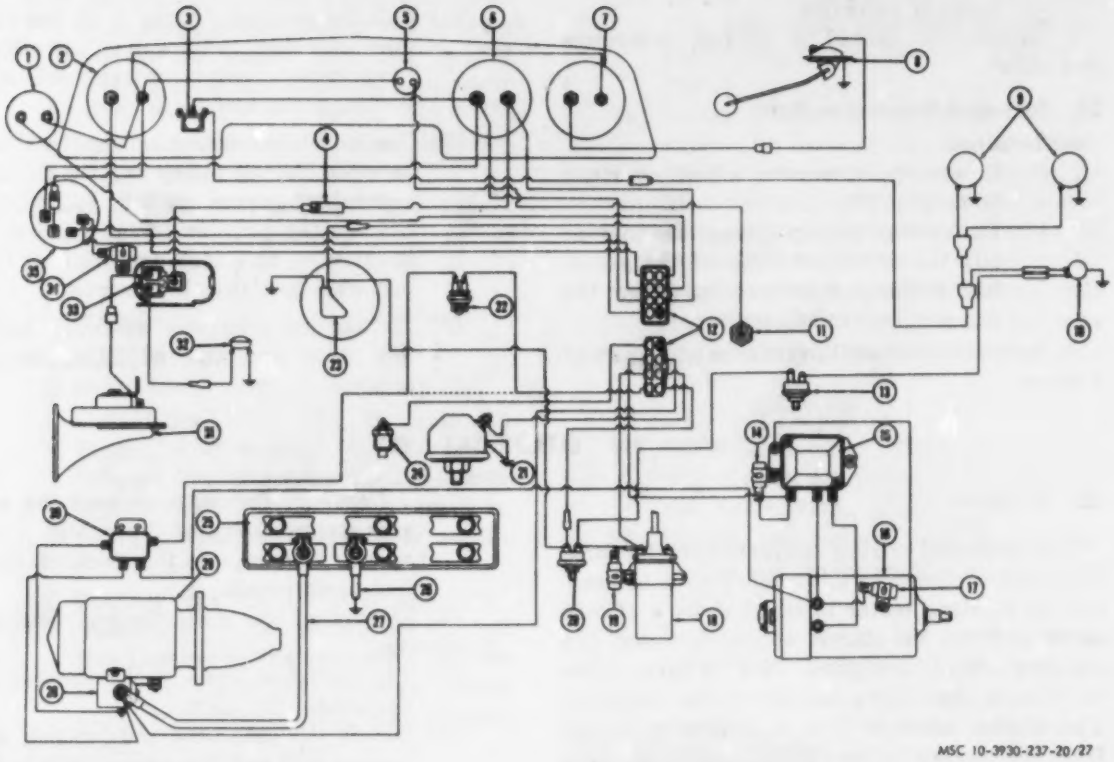
c. Installation. Install in reverse procedure of *b* above.

38. Generator Regulator

a. Testing and Adjustment. A view of the generator regulator with the cover removed is shown in figure 28.

(1) Remove the two screws that secure the cover to the regulator base assembly; remove the cover.

Note. The generator regulator must be in operating position when being adjusted or tested. Power to the regulator must be shut off when making adjustments. All tests must be made with the regulator at operating temperature and connected to the same type



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1 Engine oil pressure gage
2 Engine temperature indicator
3 Light switch
4 Fuse holder
5 Transmission oil temperature light
6 Ammeter
7 Fuel gage
8 Fuel level sender
9 Headlight
10 Stoplight and taillight
11 Transmission oil temperature sender
12 Connector
13 Stoplight switch
14 Capacitor
15 Generator regulator
16 Generator
17 Capacitor
18 Coil
19 Capacitor
20 Hour meter switch
21 Oil pressure sender
22 Neutral switch
23 Hour meter
24 Engine temperature sender
25 Battery
26 Ground cable
27 Positive cable
28 Starting motor solenoid switch
29 Starting motor
30 Starting motor relay switch
31 Horn
32 Horn button
33 Horn relay
34 Capacitor
35 Starter and ignition switch

Figure 27. Electrical wiring diagram.

of dc generator as is used on the engine. Replace the cover after each adjustment and operate the generator until the regulator returns to its normal operating temperature. The voltage and current regulator tests must be made with the generator speed equal to the maximum speed reached by the engine in service.

(2) Clean the contact points of the regulator when they show signs of oxidation and pitting. Oxidation of the contacts reduces the generator output. Clean the thicker (tungsten) contact points with a riffler file until the oxidation is removed. Clean the thinner (platinum) contact with crocus cloth; wash with carbon tetrachloride to remove any oily film. Blow the filings from the unit with compressed air to prevent them from becoming embedded in the contact surfaces.

Caution: **Do not file the contact points excessively. Never use sandpaper or emery cloth. Use a clean ignition file.**

Caution: **Check airgap and point gap opening with the battery disconnected.**

(3) Test and adjust the cutout relay as follows:

(*a*) Measure the airgap of the cutout relay between the armature and the core with the contact points barely touching. The airgap should be 0.020 inch. If the points do not close, aline the lower contact bracket slightly or bend the spring fingers on the armature until the points meet and aline. Adjust the airgap by loosening the two screws attaching the lower contact bracket. Raise or lower the contact bracket as required. Aline the contact points and tighten the screws. Measure the contact point opening; it should be 0.020 inch. Adjust to obtain the correct contact point opening by bending the upper armature stop. To test the closing voltage, connect the regulator as shown in figure 29.

Caution: **Never close the cutout relay contact points by hand with the battery connected to the voltage regulator. This would cause high current to flow through the units and seriously damage them.**

(*b*) Gradually increase the speed of the generator until the relay contacts close. Note the voltage; it should be between 11.8 and 13.5 volts. If the closing voltage is not within this range, adjust by turning the adjusting screw on top of the cutout relay.

Caution: **Cycle the generator before each test and adjustment by reducing the generator speed until the cutout relay opens; then increase the speed slowly until the proper speed for testing is reached.**

(4) Test and adjust the voltage regulator as follows:

(*a*) Measure the voltage regulator airgap. Push the armature down until the points open; release until the points barely close. Measure the airgap at the point between the armature and the part of the core next to the residual pin. The airgap should be 0.072 inch. Adjust by loosening the contact mounting screws, inserting a 0.075-inch thick flat gage in the airgap. Position the contacts so they barely touch; secure the contact mounting screws. Connect the regulator as shown in figure 30.

Caution: **Make sure the ends of the leads are insulated from the ground at all times to avoid a short circuit.**

(*b*) Cycle the generator as directed in (3) above. With the generator operating at 4000 rpm and the regutor at operating temperature, note the voltage registered on the voltmeter; it should be between 13.8 and 14.8 volts. If the voltage is not within this range, adjust by turning the adjusting screw at the back of the voltage regulator. Cycle the generator after each change or adjustment.

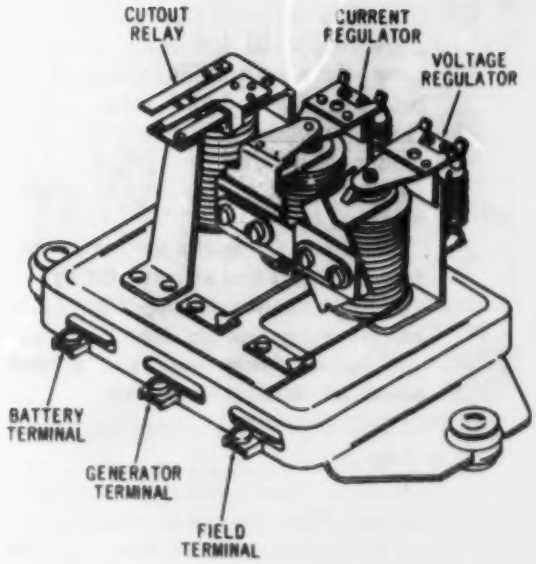


Figure 28. Generator regulator.

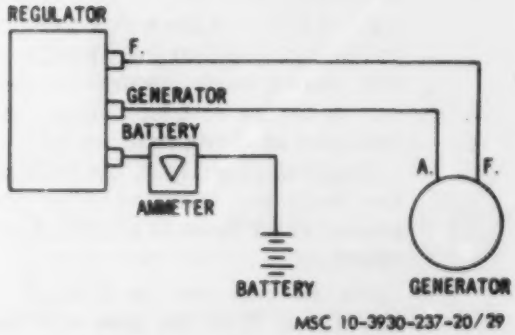


Figure 29. Cutout relay closing voltage test circuit.

(5) Test and adjust the current regulator as follows:

(a) Measure the airgap of the current regulator by the same method used to measure the airgap of the voltage regulator in (4) (a) above. This airgap between the armature and that part of the core next to the residual pin should be 0.075 inch. Adjust the airgap by loosening the contact mounting screws and positioning the contact. Tighten the screws after the proper setting is obtained.

(b) Test the current regulator setting by connecting the regulator as shown in figure 31. Prevent voltage regulator operating during the test connecting a carbon pile load of approximately the same value as the current regulator setting across the battery terminals during the time

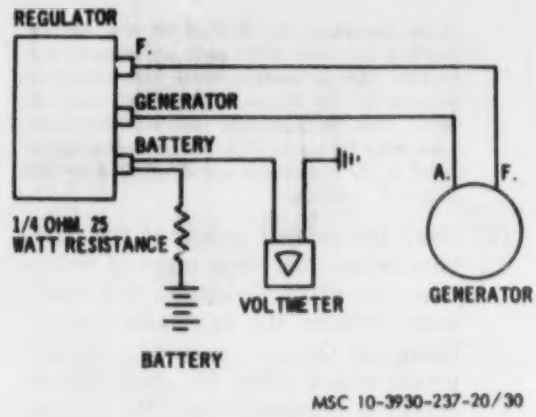


Figure 30. Voltage regulator setting test circuit.

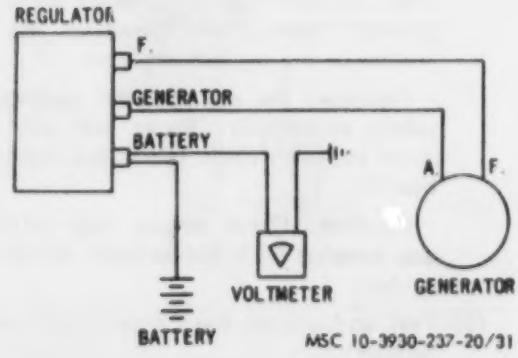


Figure 31. Current regulator setting test circuit.

the current regulator setting test is made. When the generator output is increased to maximum, the current should be 23 to 27 amperes. If the amperage is not within this range, adjust by rotating screw at the back of the current regulator. After each change of adjustment, reduce the generator speed until the cutout relay opens; then return to speed and check the current indication on the ammeter.

b. Removal.

(1) Tag and disconnect the leads to the generator regulator (fig. 28).

(2) Remove the three screws, nuts, and lockwashers that secure the regulator to the frame bracket; remove the regulator.

c. Cleaning and Inspection.

(1) Clean the exterior of the regulator with a cloth dampened in an approved cleaning solvent.

(2) Inspect the cover and base for distortion, dents, or other damage.

(3) Replace the regulator, if defective.

d. Installation.

(1) Install in reverse procedure of *b* above.

Figure 32. Starting motor.

(2) Polarize the generator by momentarily connecting a jumper across the BAT and GEN terminals of the generator regulator.

39. Starting Motor

a. Removal.

(1) Disconnect the positive battery cable from the starter. Tag and remove leads to the solenoid switch mounted on the starting motor (fig. 32).

(2) Remove the bolts and lockwashers that secure the starting motor to the flywheel housing; remove the starting motor.

b. Installation. Install in reverse procedure of *a* above.

40. Ignition Distributor

a. Removal and Disassembly.

(1) Sketch the leads to the distributor (fig. 33); remove the leads. Loosen the clamp that secures the distributor to the engine.

(2) Remove the distributor cap, rotor, and cover. Remove the screw that secures the breaker point set; remove breaker point set. Remove condenser terminal from clip; remove the condenser.

b. Inspection and Repair.

(1) Inspect the cap and rotor for chips, cracks, carbon runners, corroded terminals, or burned inserts. Replace the cap and rotor, if defective.

(2) Turn the breaker cam slightly in the direction of rotation. If the advance springs do not return the cam to its original position without hesitation, replace the distributor.

(3) Inspect the contact points for pitting, wear, or burning. Replace the points and condenser if they are defective. Points that are only very slightly pitted may be dressed with a fine-cut point file.

c. Assembly and Installation. Install in reverse procedure of *a* above.

d. Contact Point Adjustment.

(1) Remove the distributor cap, rotor, and cover. It is not necessary to remove

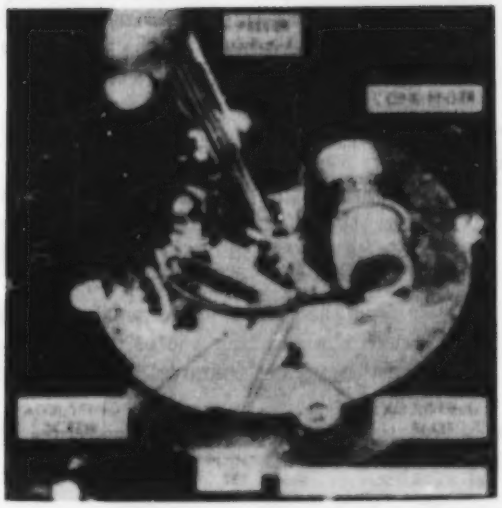


Figure 33. Distributor, condenser, and contact points.

the spark plug wires from the distributor cap.

(2) If the contact points are pitted or rough, dress them using a fine-cut contact point file. Remove only the worst of the roughness. Do not attempt to remove all roughness or to dress the points until smooth.

(3) Using the starting motor, rotate the engine until contact point cam follower is at a high spot on the cam (points are spread as far as possible).

(4) Using a wire feeler gage as shown in figure 33, check the gap between the points. If the point gap is not 0.022 inch, loosen the lock screw and with proper size screw drive in adjusting slot, move plate until proper adjustment is obtained. Tighten the lock screw.

(5) Install the cover, rotor, and cap.

(6) Check the ignition system timing (para. 16). If the system is out of time, time it.

41. Spark Plugs

a. Removal.

(1) Clean the cylinder head around the spark plugs. Disconnect the spark plug wires.

(2) Using a deep well socket, remove the spark plugs from the cylinder head. Remove the spark plug gaskets.

b. Cleaning, Inspection, Adjustment, and Testing.

(1) Remove all carbon and lead deposits from the electrodes and insulator shell with a sand blast cleaner.

(2) Inspect the spark plugs for cracked or damaged porcelain, eroded or damaged electrodes, or other defects.

(3) Set the plug gap at 0.025 inch using a wire-type feeler gage.

(4) Test the spark plugs on a standard spark plug tester.

(5) Replace defective spark plugs.

c. Installation. Install in reverse procedure of *a* above.

42. Gages and Instruments

a. Removal.

(1) Tag and remove the leads to the hour meter (10, fig. 34) and the engine oil pressure gage (13). Remove the nuts and mounting straps that secure the hour meter and engine oil pressure gage to the lower instrument panel (8); remove the hour meter, gasket (11), washer (12), and engine oil pressure gage from the front of the panel.

Warning: **Before removing leads from switches, gages or senders, disconnect the positive battery cable.**

(2) Remove the screws (7), nuts, and lockwashers that secure the instrument panel (6) to the dash and the lower instrument panel (8); raise the instrument panel enough to provide access to the back of the panel.

(3) Tag and remove the leads to the starter and ignition switch (9). Remove the nut that secures the starter and ignition switch to the instrument panel; remove the starter and ignition switch from the front of the panel.

(4) Tag and remove the leads to the light switch (4). Remove the knob and the

nut that secures the light switch to the instrument panel; remove the light switch from the rear of the panel.

(5) Tag and remove the leads to the transmission oil temperature light (3). Remove the nut that secures the light to the instrument panel; remove the light from the rear of the panel.

(6) Tag and remove the leads to the fuel gage (1), ammeter (2), and engine temperature indicator (5). Remove the nuts and straps that secure the gages to the instrument panel; remove the gages from the front of the panel.

(7) Tag and remove the leads to the oil pressure sender and the hour meter switch (20, fig. 27) on the left side of the engine. Remove the oil pressure sender and hour meter switch.

(8) Tag and remove the lead to the transmission oil temperature sender (11, fig. 27); remove the temperature sender.

(9) Drain the cooling system. Tag and remove the lead to the engine temperature sender (24, fig. 27); remove the temperature sender.

(10) Drain the fuel tank to a level below the fuel level sender (8). Tag and remove the lead to the fuel level sender. Remove the screws and lockwashers that secure the fuel level sender to the fuel tank; remove the fuel level sender and gasket.

b. Cleaning and Inspection.

(1) Clean the gages, switches, light, and senders with a cloth dampened in an approved cleaning solvent.

(2) Inspect gages for broken glass, damaged threads, damaged or illegible dial, dents, or other damage.

(3) Inspect the light for broken glass, a burned-out bulb, damaged threads, or other damage.

(4) Inspect the switches for rough or binding operation, burned terminals, damaged threads, or other damage.

(5) Inspect the senders for damaged threads, burned terminals, or other damage.

(6) Replace damaged or defective parts.

c. Installation. Install in reverse procedure of *a* above.

43. Battery and Cables

a. Battery Cleaning.

(1) Remove dirt and grease accumulated on the battery with a clean cloth.

(2) Pour a solution of baking soda and water on the top of the battery to neutralize any acid present. Continue to pour until the solution no longer bubbles when it contacts the battery.

(3) Loosen the nuts that secure the battery cables to the battery posts; remove the cables. Clean all corrosion from the cable clamps and posts with a wire brush or jackknife. Replace the cables; tighten the nuts.

(4) Lightly coat the battery posts and cable clamps with high temperature grease.

b. Battery Testing.

(1) Test the state of the electrolyte using a hydrometer. If the battery is not fully charged, charge it.

(2) Connect a voltmeter across the terminals of the battery, and note the reading. Pull the high tension cable from the ignition coil, crank the engine with the starter, and note the reading on the voltmeter. If the difference between the two readings is more than 4 volts or the second reading is less than 8 volts, replace the battery.

c. Battery Removal.

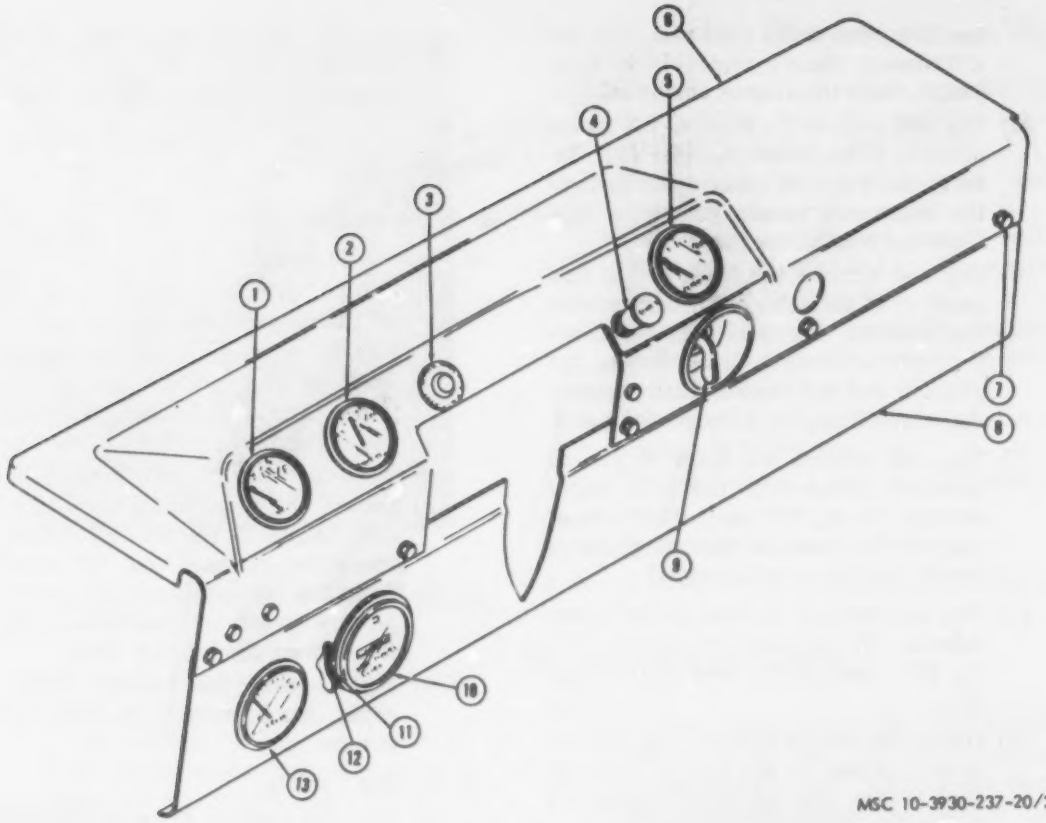
(1) Loosen the nuts (fig. 35) that secure the battery cables to the battery posts; remove the cables.

(2) Remove the nuts, lockwashers, and plain washers that secure the battery clamp to the studs; remove the battery clamp.

(3) Remove the battery from the tray.

d. Cleaning and Inspection.

(1) Clean the battery tray and clamp by



1 Fuel gage
2 Ammeter
3 Transmission oil temperature light
4 Light switch
5 Engine temperature indicator
6 Instrument panel
7 Screw
8 Lower instrument panel
9 Starter and ignition switch
10 Hour meter
11 Gasket
12 Washer
13 Engine oil pressure gage

Figure 34. Gages and instruments.

flushing with a solution of baking soda. Flush parts until bubbling stops when new solution is applied.

(2) Inspect the battery for loose posts, cracks, evidence of leaks, or other damage.

(3) Test the battery as directed in *b* above.

e. Battery Installation. Install in reverse procedure of *c* above.

f. Cable Removal.

(1) Loosen the nuts (fig. 35) that secure the cables to the battery posts; remove the cables.

(2) Remove the starting motor mounting bolt (fig. 32) and lockwasher that secure the ground cable to the flywheel; remove the cable.

(3) Remove the nut and lockwasher that secure the positive battery cable (27, fig. 27) to the solenoid switch mounted on the starting motor; remove the cable.

g. Cleaning and Inspection.

(1) Clean the cables with a cloth dampened in an approved cleaning solvent. Clean cable clamps and lugs with a wire brush.

(2) Inspect the cables for damaged insulation, breaks, or other damage.

(3) Inspect cable clamps and lugs for corrosion, distortion, poor connections to cables, or other damage.

(4) Replace cables if defective.

h. Cable Installation. Install in reverse procedure of *f* above.

44. Lights

a. Headlight Lamp Replacement.

(1) Remove the screw (6, fig. 36) that secures the cowl (5) to the body (1) remove the cowl.

(2) Remove the two screws (3) that secure the leads to the lamp in the cowl; remove the lamp.

(3) Connect the leads to the lamp with the screws.

(4) Position the lamp in the cowl (5); secure with the retaining ring (2). Position the cowl on the body; secure with the screws (6).

b. Headlight Assembly Removal.

(1) Remove the headlight lamp as directed in *a* above.

(2) Pull the leads from the body (1, fig. 36).

(3) Remove the screw (7), nut (10), and washers (8), that secure the body to the mounting bracket (9); remove the body.

c. Cleaning and Inspection.

(1) Clean all parts with a cloth dampened in an approved cleaning solvent.

(2) Inspect the lamp for burned or damaged terminals, chipped glass, or other damage.

(3) Inspect the body and cowl for dents, distortion, or other damage.

(4) Replace the lamp if defective or replace the headlight assembly if other parts are defective.

d. Headlight Assembly Installation. Install in reverse procedure of *b* above.

e. Stoplight and Taillight Lamp Replacement.

(1) Remove the retaining ring (7, fig. 37) that secures the lens (6) in the body (4); remove the lends.

(2) Depress the lamp (5), give it a one-quarter turn, and pull it from the body.

(3) Install the lamp in the body. Depress it and give it a one-quarter turn to engage it in the socket.

(4) Position the lens (6) in the body; secure with the retaining ring (7).

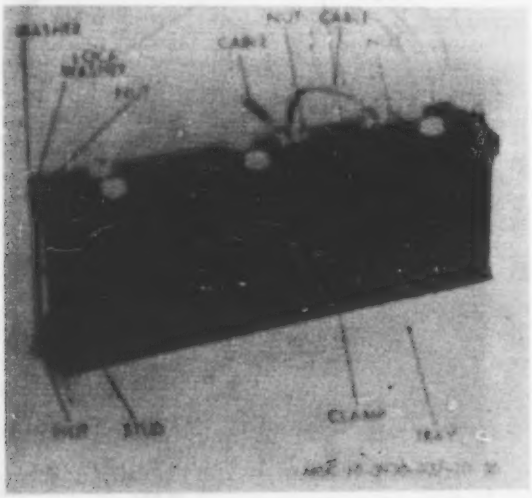
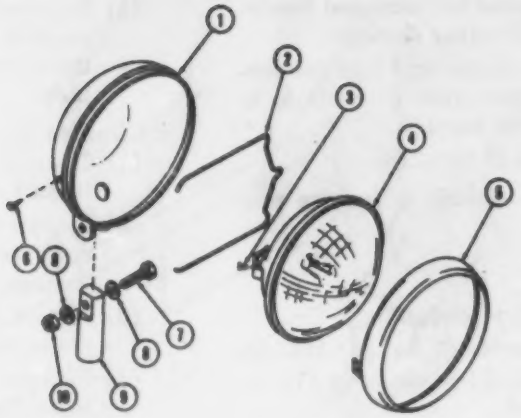


Figure 35. Battery and cables.



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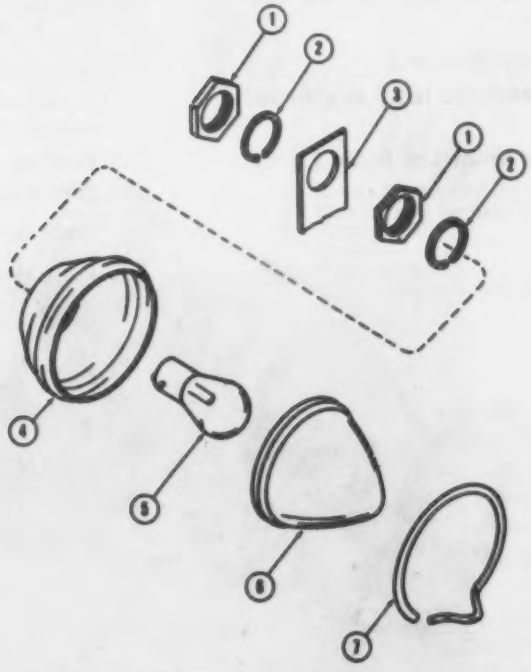
1	Body	4	Lamp	7	Screw	9	Mounting bracket
2	Retaining ring	5	Cowl	8	Washer	10	Nut
3	Screw	6	Screw				

Figure 36. Headlight assembly, exploded view.



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1	Nut	3	Mounting bracket	5	Lamp	7	Retaining ring
2	Lockwasher	4	Body	6	Lens		

Figure 37. Stoplight and taillight assembly, exploded view.

f. Stoplight and Taillight Assembly Removal.

(1) Friction-type connectors secure the stoplight and taillight leads to the truck wiring harness. Pull on the connectors to disconnect the leads.

(2) Remove the nut (1, fig. 37) and lockwasher (2) that secure the body (4) to the mounting bracket (3); remove the assembled body and lens (6).

g. Cleaning and Inspection.

(1) Clean the taillight assembly with a cloth dampened in an approved cleaning solvent.

(2) Inspect the taillight for dents, damaged threads, damaged lens, distortion, or other damage.

(3) Replace the bulb if defective, replace the stoplight and taillight assembly if other parts are defective.

h. Stoplight and Taillight Installation. Install in reverse procedure of *f* above.

Section IX. TRANSMISSION

45. General

The transmission is mounted between the engine and drive axle assembly, immediately below the operator's compartment floor plates. The transmission is connected to the torque converter on one end and to the differential pinion gear on the other. It is a constant-mesh, full reversing, power-shifted type. The forward and reverse directions are selected by positioning the direction shift lever mounted on the steering column. The direction shaft lever is connected by mechanical linkage to the selector lever on the top of the transmission.

46. Lever and Linkage Adjustment

If the direction shift lever is in the neutral position and too far forward or too far to the rear for convenient operation, adjust the shift lever linkage as follows:

a. Move the direction shift lever to neutral. Remove the cotter pin (fig. 38) and pin that secure the clevis to the transmission selector lever.

b. Loosen the nut that locks the clevis on the shift linkage.

c. Adjust the clevis so that the direction shift lever will be in a convenient neutral position when the clevis is connected to the transmission selector lever. Shortening the linkage moves the neutral lever position forward. Lengthening the linkage moves the neutral lever position to the rear.

d. Install the clevis on the transmission selector lever with a pin and cotter pin. Tighten the nut against the clevis to lock the adjustment.

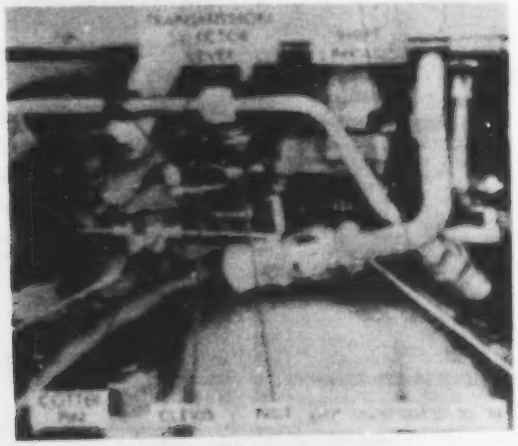


Figure 38. Shift linkage.

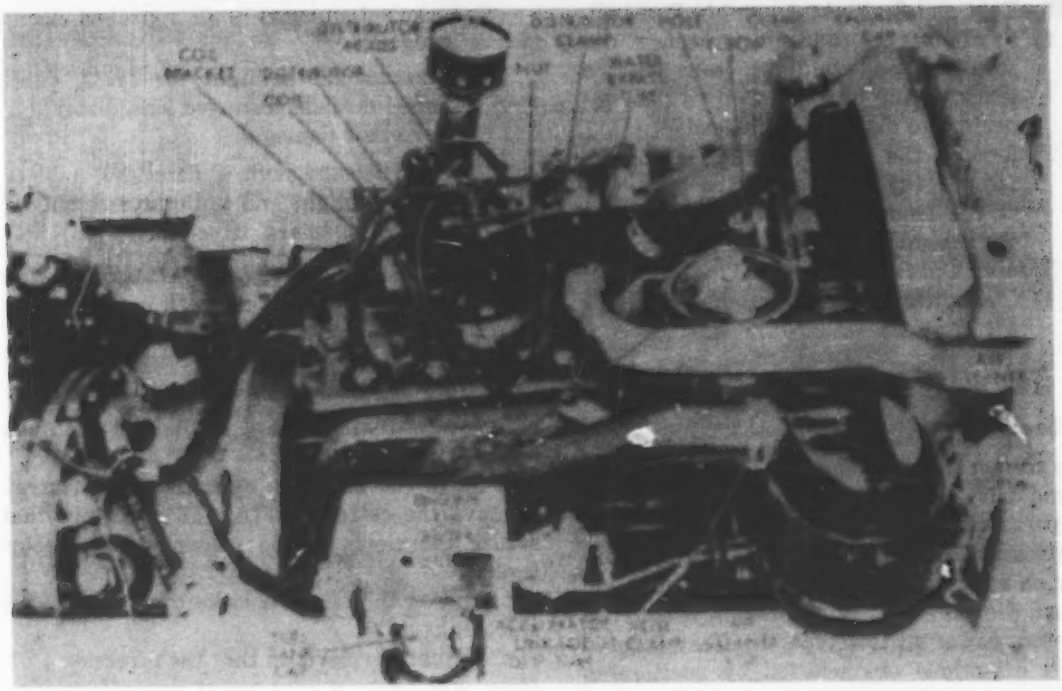
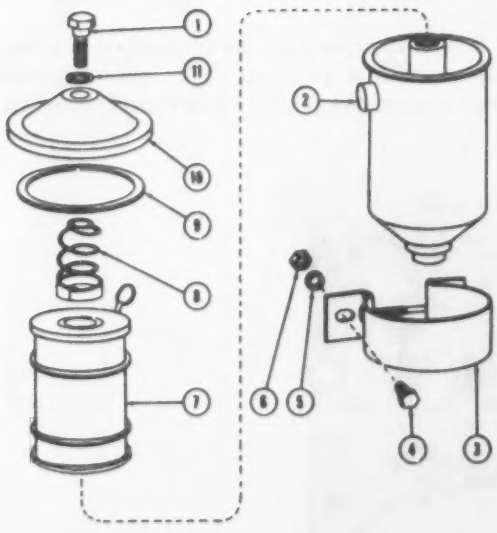


Figure 39. Engine compartment, left view.



1 Screw
2 Body
3 Mounting strap
4 Bolt
5 Lockwasher
6 Nut
7 Cartridge
8 Spring and retainer
9 Gasket
10 Cover
11 Gasket

Figure 40. Transmission oil filter, exploded view.

e. Using the direction shift lever, shift the transmission into forward and reverse. Watch the linkage, shift lever, and selector lever during the shift to be sure there is no obstruction and the transmission goes completely into either gear.

47. Transmission Oil Filter

a. Cartridge Replacement. Replace the transmission oil filter cartridge (fig. 40) whenever the transmission oil is drained and changed.

(1) Remove the screw (1, fig. 40) that secures the cover (10) to the body (2); remove the gasket (11), cover gasket

(9), spring and retainer (8), and cartridge (7).

(2) Remove oil from the body with a syringe. Wipe the body and cover clean, inside and out, with a clean cloth.

(3) Install a new cartridge in the body; install the spring and retainer on the cartridge. Position the gaskets on the cover; install the cover on the body; secure the cover with the screw.

b. Oil Filter Removal.

(1) Disconnect oil lines from the body.

(2) Remove the bolts (4, fig. 40), lockwasher (5), and nut (6) that secure the mounting strap (3) to the frame; remove the assembled mounting strap and body.

(3) Remove the mounting strap from the body.

c. Installation. Install in reverse procedure of *b* above.

Section X. BRAKES

48. General

The service brakes are mounted between the front wheels inside the axle adapters on either side of the differential housing. The brakedrum rotates with the drive axles, and the shoe assemblies are secured to the spindle supports. These brakes are hydraulically operated by the brake master cylinder, which is mechanically linked to the service brake pedal. The handbrake is mounted on the rear of the transmission. The handbrake rotates on a transmission pinion shaft, and the brakeshoe assembly is secured to the transmission housing. The brakeshoe is connected by a mechanical linkage to the handbrake handle.

49. Handbrake Handle Assembly and Linkage

a. Removal.

(1) Place the handbrake handle in the released position.

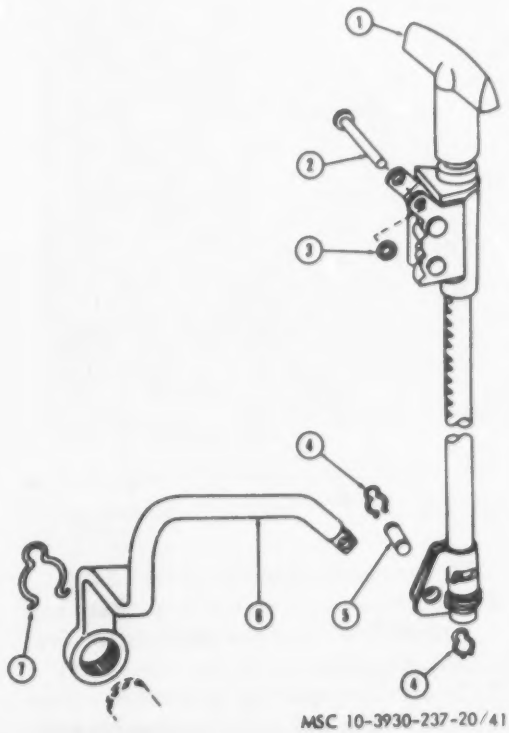
(2) Remove the retaining clips (4, fig. 41) and pin (5) that secure the lever (6) to the handle assembly (1).

(3) Remove the spring nut (3) and pin (2) that secure the handle assembly to the seat support; remove the handle assembly.

(4) Remove the retaining clip (7) that secures the lever (6) to the stub shaft on the side of the transmission housing; remove the lever.

b. Installation. Install in reverse procedure of *a* above.

c. Adjustment. When properly adjusted, the parking brake must be capable of holding the truck on a 15-percent grade with a full, rated load. Full application of a properly adjusted brake will require 1½ to 2 inches travel of the handbrake lever.



1 Handle assembly
2 Pin
3 Spring nut
4 Retaining clip
5 Pin
6 Lever
7 Retaining clip

Figure 41. Handbrake handle assembly, exploded view.

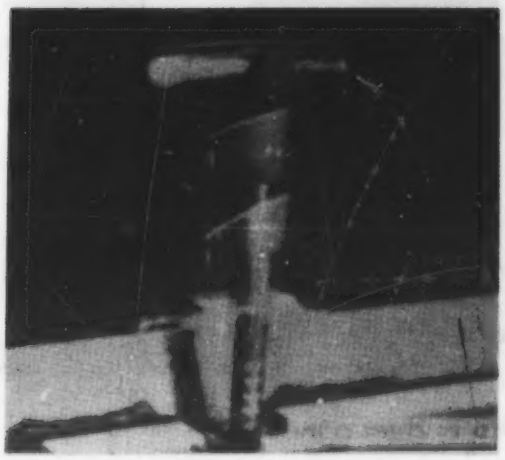


Figure 42. Handbrake showing brake applied notches.

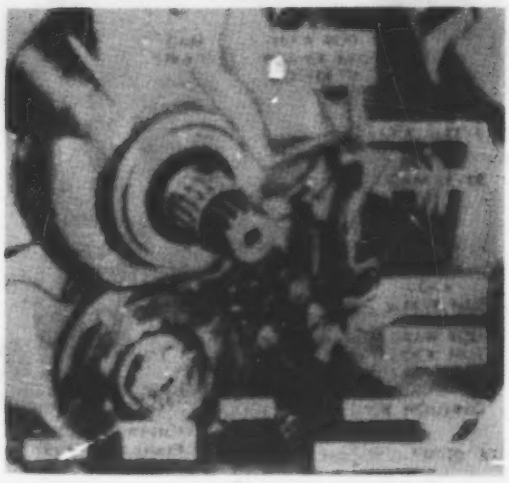


Figure 43. Handbrake, torque converter removed to show details.

(1) Raise the forklift truck on a hoist.
(2) Hold the lock sleeve (fig. 38) and loosen the draw rod lock nut several turns.
(3) Reduce free play in the brake linkage by turning the locknut sleeve counterclockwise. Hold the lock sleeve and tighten the draw rod locknut snugly against the cam lever; then back the draw rod locknut off for a one-half to three-quarter turn.
(4) Lower the hoist. Apply the handbrake using the handbrake handle. If handbrake handle free travel is not between 1½ and 2 inches, or if the brake applied notches are visible with the brakes applied, readjust the lock sleeve.

50. Service Brakeshoes

a. Removal.

(1) Jack up the front wheels of the forklift truck.
(2) Remove the wheel and tire (para. 55*a*).
(3) Disconnect the hydraulic brake line (fig. 44) at the wheel cylinder.
(4) Remove the hubcap (1, fig. 49), cotter pin (23), nut (2), hub assembly (6), ring gear (7), and bearing cones (4 and 25).
(5) Remove the bolts and lockwashers and nuts and lockwashers that secure the spindle support (16, fig. 49) to the differential housing; remove the assembled brake (15), spindle support (16), pinion shaft (22), and spindle (9).
(6) Remove the retaining ring (10) that secures the drum (11) to the pinion and shaft (22); pull the drum from the pinion shaft.
(7) Remove the retainer spring (fig. 45) and the guide pin springs and spring retainers; remove the brakeshoes.

b. Installation. Install in reverse procedure of *a* above.

c. Adjustment. The brakeshoes will be automatically adjusted the first time the brakes are applied and will automatically stay in adjustment until the brake linings are worn out.

d. Bleeding Brake System.

(1) Wipe the top of the master cylinder clean. Connect a pressure bleeder filled with about 2 quarts of hydraulic brake fluid to the master cylinder. Pressurize the bleeder to about 30 psi.
(2) Loosen the fitting at joint A (fig 46)

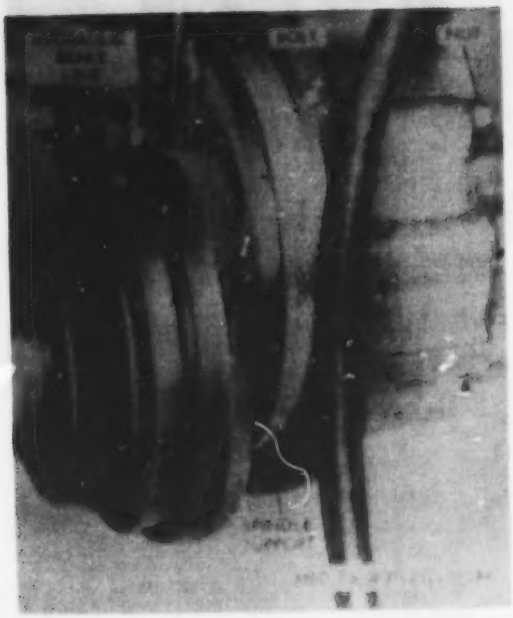


Figure 44. Spindle support mounting bolts.

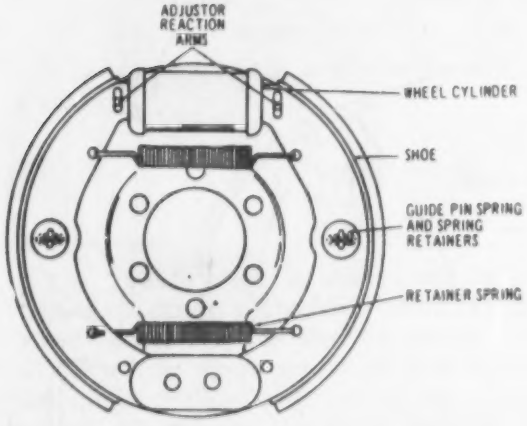


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Figure 45. Brake assembly.

enough to permit fluid and bubbles to escape from the line. Tighten the fitting when escaping fluid is free of bubbles.

(3) Loosen the inching valve-check-ball stop bolt at point B. Depress the brake pedal to the floor, forcing fluid to flow from the bolthole. Tighten the stop bolt while holding the brake pedal down. Release the brake pedal. Repeat this process until fluid being forced from the bolthole is free from bubbles. Tighten the stop bolt.

Note. Air will be admitted to the system if the brake pedal is released while the stop bolt is loose. Always tighten the stop bolt before releasing the brake pedal.

(4) Loosen the fitting at point C. Bleed the system as directed in (3) above. Tighten the fitting.

(5) Install a bleeder hose on the bleeder valve at point D. Submerge the loose end of the bleeder hose in a transparent jar containing several inches of brake fluid. Hold the jar above the level of the bleeder valve. Open the bleeder valve and depress the brake pedal to the floor, allowing fluid to flow through the bleeder valve and tube. Repeat this process until bubbles can no longer be seen in the jar of fluid. Close the bleeder valve, and disconnect the hose.

Note. Keep the free end of the bleeder hose submerged in the fluid in the jar at all times while the bleeder valve is open.

(6) Connect the bleeder hose at point E and bleed that portion of the system as directed in (5) above.

(7) Disconnect the pressure bleeder from the master cylinder and install the master cylinder cap.

51. Brake Master Cylinder

a. Removal.

(1) Remove the right tilt cylinder (para. 65*a*).

(2) Remove the cotter pin, (6, fig. 47) and clevis pin (7) that secure the clevis (5) to the brake pedal linkage.

(3) Disconnect the hydraulic brake lines at the master cylinder.

(4) Disconnect the stoplight switch leads at the stoplight switch on the master cylinder.

(5) Remove the three screws (10), lockwashers (9), and nuts (8) that secure

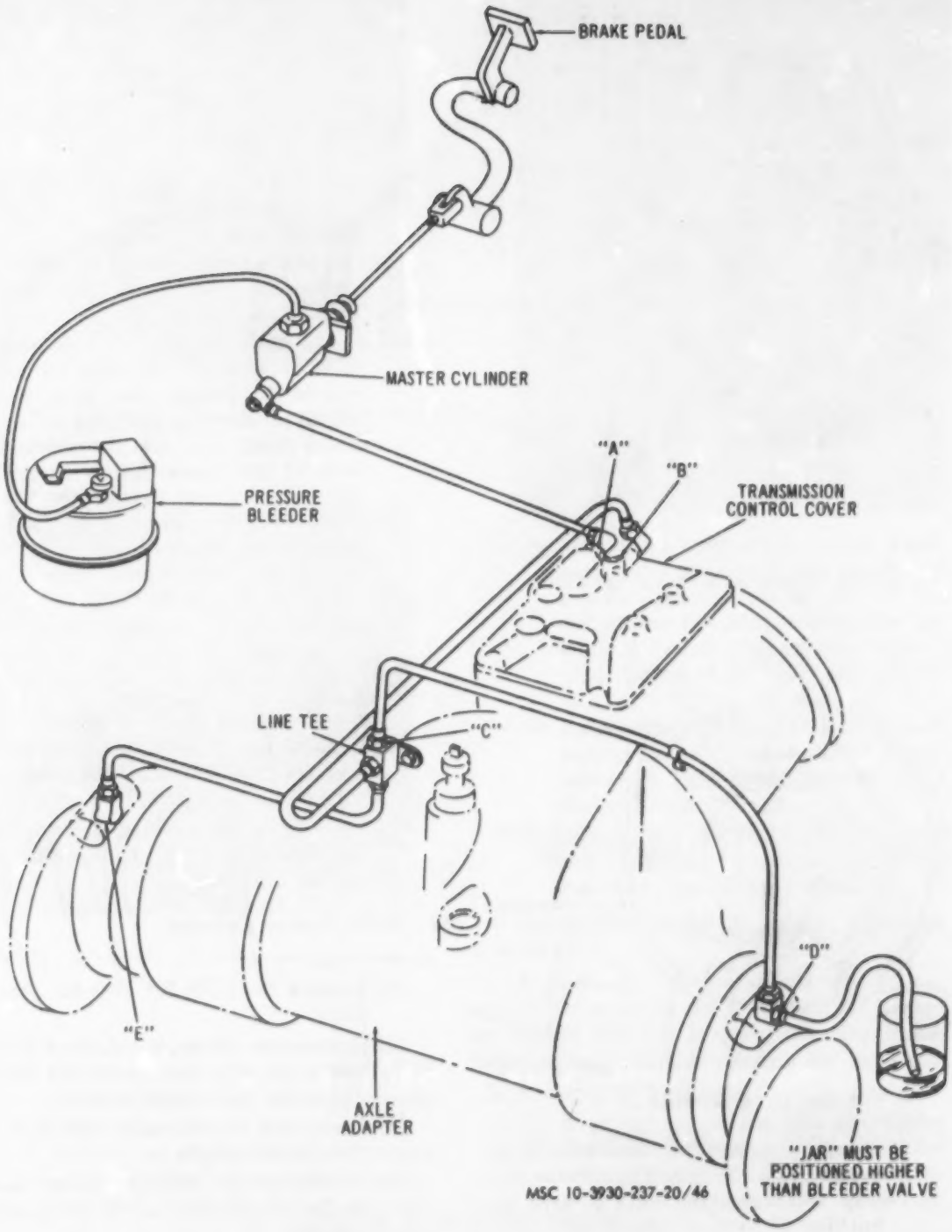
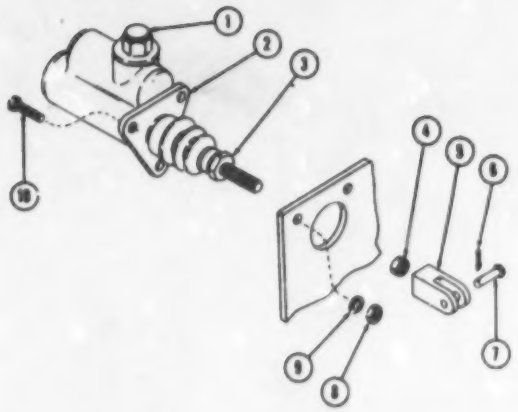


Figure 46. Brake bleeding procedure.



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1	Master cylinder cap	6	Cotter pin
2	Brake master cylinder	7	Clevis pin
3	Adjuster	8	Nut
4	Locknut	9	Lockwasher
5	Clevis	10	Screw

Figure 47. Brake master cylinder, exploded view.

the master cylinder to the frame; remove the master cylinder.

b. Installation. Install in reverse procedure of *a* above.

52. Wheel Cylinder Assembly

a. Removal.

(1) Remove the spindle, hub, spindle support, and the brakeshoes (para. 50*a*).

(2) Remove the screws (13), washers (14) (fig. 49) that secure the brake support plate to the spindle support (16); remove the plate.

(3) Remove the bolt that secures the wheel cylinder (fig. 45) to the support plate; remove the wheel cylinder.

b. Installation. Install in reverse procedure of *a* above.

53. Service Brake Pedal and Linkage Adjustment

a. Measure brake pedal free travel with a ruler. If free travel is between 3/16 and 5/16 inch, no linkage adjustment is necessary.

b. Adjust brake linkage at the master cylinder located below the right-hand tilt cylinder to bring free travel within tolerance as follows:

(1) Loosen the locknut (4, fig. 47).

(2) Rotate adjuster (3) until free brake pedal travel is between 3/16 and 5/16 inch.

(3) Tighten the locknut against the clevis (5).

Section XI. WHEELS

54. General

The forklift truck is steered by the rear wheels and driven by the front wheels. The rear wheels connect to the steering system (para 57). The front wheels are driven by a ring gear and pinion mounted in the wheel hub. All four wheels are mounted on roller bearings that must be cleaned and repacked at the intervals indicated in the lubrication order (fig. 3).

55. Wheels and Tires

a. Removal.

(1) Jack up the forklift truck so that the tire to be removed clears the floor.

(2) To remove the wheels, remove the bolts (fig. 43) that secure the wheel and tire assembly to the hub; remove the wheel and tire assembly.

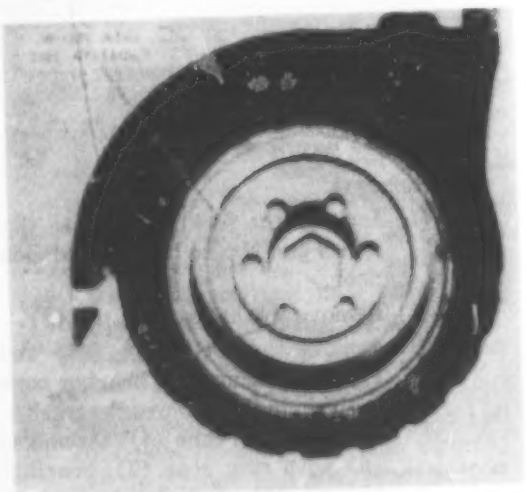
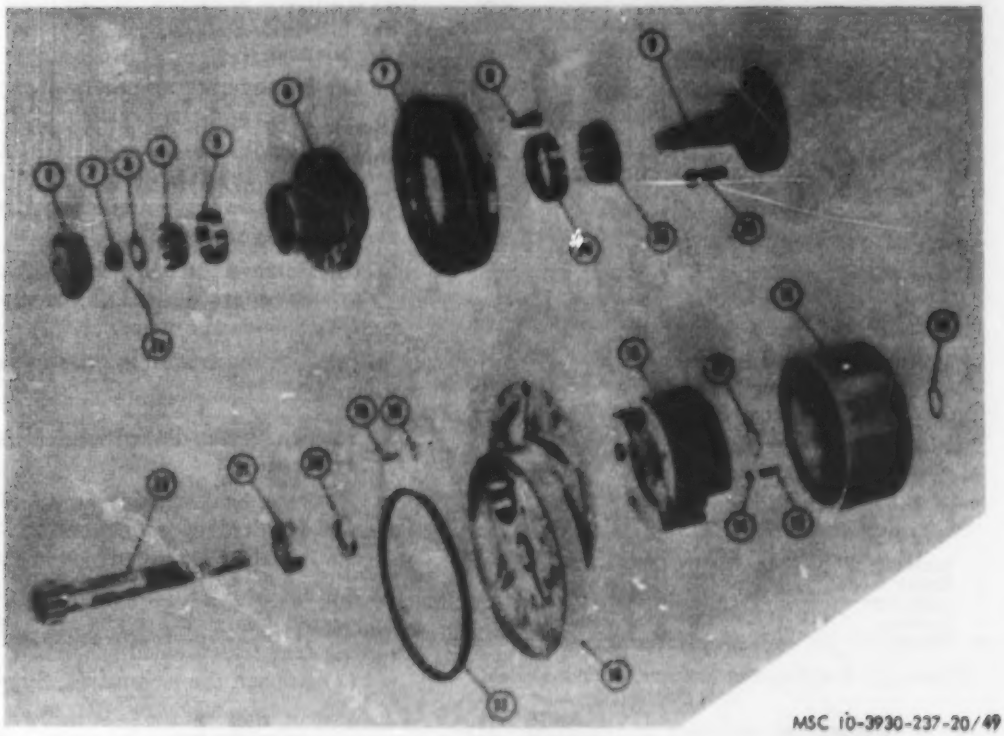


Figure 48. Wheel and tire.



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1	Hubcap	8	Bolt	15	Brake	21	Bearing
2	Nut	9	Spindle	16	Support	22	Shaft
3	Washer	10	Snapring	17	Seal	23	Cotter pin
4	Bearing cone	11	Brakedrum	18	Washer	24	Bearing cup
5	Bearing cup	12	O-ring	19	Bolt	25	Bearing cone
6	Hub	13	Bolt	20	Seal	26	Bolt
7	Ring gear	14	Lockwasher				

Figure 49. Drive wheel hub, spindle, and brake.

b. Installation. Install in reverse procedure of *a* above.

56. Wheel Bearings

a. Removal.

(1) Jack up the forklift truck so that the wheel and tire to be removed clear the floor.

(2) Remove the hubcap (1, fig. 49).

(3) Remove the cotter pin (23) and nut (2) that secure the bearing cone (4) to the spindle; remove the washer (3), outer bearing cone (4), assembled hub (6) with ring gear (7), bearing cups (5 and 24), and inner bearing cone (25).

(4) If defective, press the bearing cups (5 and 24) from the hub.

b. Cleaning and Inspection.

(1) Clean the bearings in an approved cleaning solvent; dry with clean, dry compressed air. If necessary, tap the large side of the bearings on a wooden block to dislodge solidified lubricant. Direct the stream of air at the bearing so that the bearing will not be rotated by the force of air. Dip bearings in oil immediately after cleaning.

(2) Clean the hub and spindle with a clean cloth dampened in an approved cleaning solvent.

(3) On drive wheels, clean the ring gear

and pinion with a brush and an approved cleaning solvent.

(4) Inspect bearings for pitting, scoring, wear, or other damage, and for rough or binding operation.

(5) Inspect the spindle for scoring, damaged threads, cracks, or other damage.

(6) Inspect the hubs for damaged threads, cracks, or other damage.

(7) Inspect the ring gear and pinion of the drive wheels for cracks, damaged teeth, or other damage.

(8) Inspect the seal of the drive wheels for cuts, scratches, nicks, or other damage.

(9) Replace damaged parts.

c. Packing, Installation, and Adjustment.

(1) Install in reverse procedure of *a* above.

(2) Pack the bearings with the lubricant recommended by the lubrication order (fig. 3).

(3) Pack the ring gear and pinion of the drive wheels with the lubricant recommended by the lubrication order (fig. 3).

Section XII. STEERING

57. General

The forklift truck is steered by the rear wheels. Steering is done by a steering handwheel through the steering gear and a drag link mechanically connected between the steering gear steering arm and the steering axle steering arm or bellcrank. The bellcrank is connected to the rear steering wheels by tie rods.

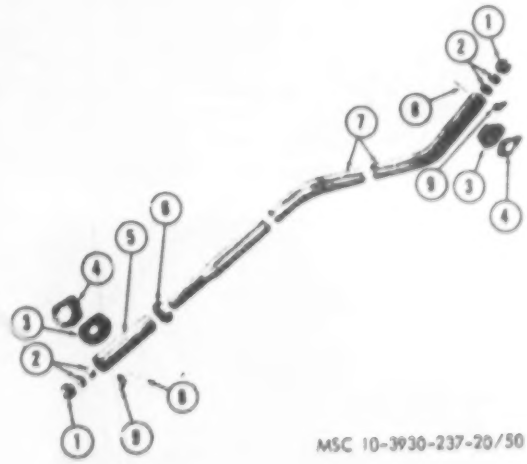
58. Drag Link

a. Removal.

(1) Remove cotter pin (8, fig. 50) and adjusting screw (1) that secure the drag link to the ball studs; remove the drag link from the ball studs.

(2) Remove the pressure cups (2), ball socket (5), nut (6), and lubrication fitting (9) from the drag link.

(3) Remove the shield (3) and cage (4) from the ball studs of the steering arms.



1 Adjusting plug
2 Plugs
3 Shield
4 Cage
5 Ball socket
6 Nut
7 Rod
8 Cotter pin
9 Grease fitting

Figure 50. Drag link, exploded view.

b. Installation and Adjustment.

(1) Install in reverse procedure of *a* above.

(2) To adjust turning radius, set the rear wheels in straight ahead position; remove ball socket (5) from steering arm ball stud and count the revolutions necessary to turn steering handwheel from extreme right to extreme left.

(3) Rotate the steering handwheel halfway between extreme right and extreme left; this will center steering arm.

(4) Adjust ball socket (5) until the ball stud hole lines up with the steering arm ball stud; lock with the nut (6).

(5) Insert a pressure cup (2) in the socket.

Position the drag link on the ball stud, insert a second cup, and secure with the adjusting screw (1) and cotter pin (8). Tighten the adjusting screw only to remove play between the drag link and steering arm.

(6) Lubricate the ball sockets at each end of the drag link.

Section XII. BODY AND SEAT

59. General

The forklift truck has hinged panels on both sides of the engine and above the engine that open to provide access to the engine compartment. Remove the floor panels to provide access to the torque converter, transmission, tilt cylinders, etc. The adjustable seat includes a backrest and cushion and a seat cushion.

60. Seat Assembly

a. Removal.

(1) Remove the seat cushion (1, fig. 51) by lifting it away from the frame (3).

(2) Remove the two screws (8) and nuts (4) that secure the backrest brackets (6) to the frame; remove the bracket cushion (2) and spacers (7). Remove the four screws (5) that secure the two brackets (6) to the backrest cushion; remove the brackets.

(3) Remove the four nuts (16) and lockwashers (15) that secure the frame (3) to the adjusters (12 and 13); remove the frame spacers (14).

(4) Remove the four nuts (9) and lockwashers (10) that secure the adjusters to the support plate; remove the adjusters and the four spacers (11).

b. Installation. Install in reverse procedure of a above.

1	Seat cushion	9	Nut
2	Backrest cushion	10	Lockwasher
3	Frame	11	Spacer
4	Nut	12	Left adjuster
5	Screw	13	Right adjuster
6	Bracket	14	Spacer
7	Spacer	15	Lockwasher
8	Screw	16	Nut

Figure 51. Seats assembly, exploded view.

61. Body Panels and Hood

a. Removal.

(1) Remove the seat (para. 60a).

(2) Open the side hoods (1 and 12, fig. 52) by depressing the latches (19) and swinging the hoods open. Remove the side hoods by lifting them off the brackets (8).

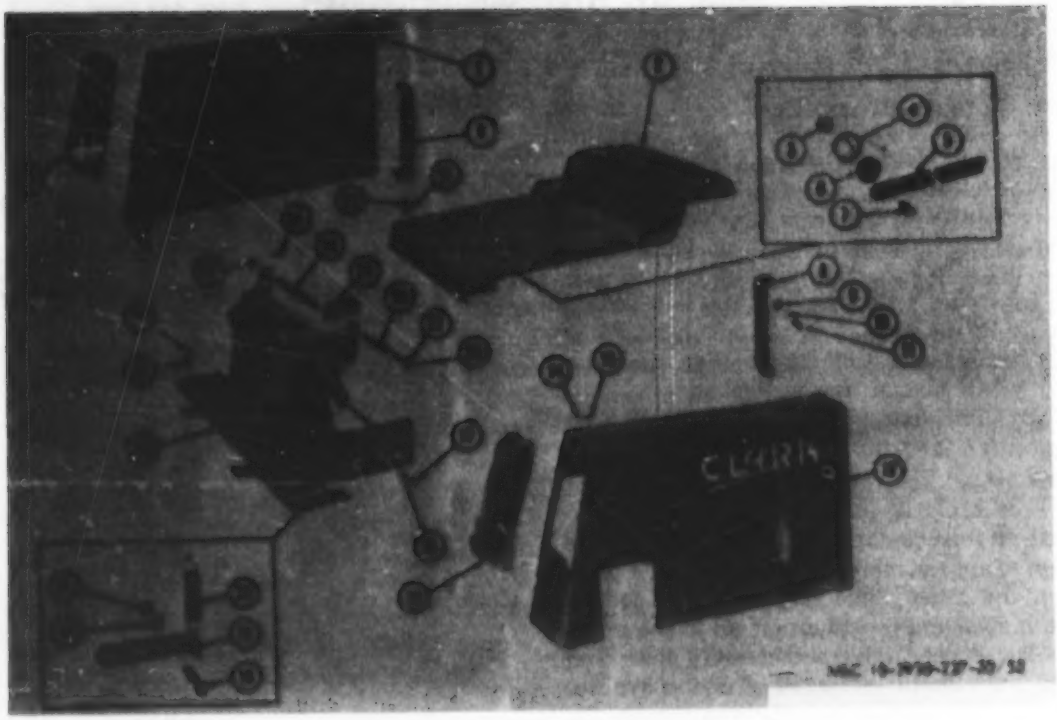
(3) Remove the pins (26) that secure the rod (28) and top hood (2) to the front hood (23); remove the rod, spacers (27), and top hood.

(4) Remove the bolt (7) and nut (3) that secure the latch (5) to the top hood (2); remove the latch, spacer (6) and spring (4).

(5) Disconnect the handbrake lever from the handbrake (para. 49a). Loosen the nut on the choke control cable and disconnect the choke control cable from the front hood (23).

(6) Remove the two screws (25) and lockwashers (24) and the four screws (17) and nuts (16) that secure the front hood to the frame; remove the front hood.

(7) Remove the spring (20) from the latch (19). Remove the two bolts (18) and nuts (22) that secure the two latches



1	Right hood	9	Washer	17	Screw	25	Screw
2	Top hood	10	Lockwasher	18	Bolt	26	Pin
3	Nut	11	Bolt	19	Latch	27	Spacer
4	Spring	12	Left hood	20	Spring	28	Rod
5	Latch	13	Screw	21	Spacer	29	Adjuster
6	Spacer	14	Lockwashers	22	Nut	30	Screw
7	Bolt	15	Air intake	23	Front hood	31	Lockwasher
8	Bracket	16	Nut	24	Lockwasher		

Figure 52. Body panels and hoods, exploded view.

(19) to the front hood; remove the latches and spacers (19 and 21).

(8) Remove the four screws and lockwashers that secure the floor plate to the frame; remove the floor plate and assembled accelerator pedal.

b. Installation. Install in reverse procedure of *a* above.

Section XIV. HYDRAULIC LIFT SYSTEM

62. General

The hydraulic lift system consists of a hydraulic pump, oil reservoir, control valve, lift cylinder, tilt cylinders, and a tilt-lock valve, together with their connecting hoses and tubes. Hydraulic oil is drawn from the reservoir by the pump which is mounted on the engine front cover. The oil is forced through a high pressure line to the control valve. When the lift and tilt control levers are in neutral position, oil flows through the valve and back to the reservoir. When one of the control levers is depressed, oil is diverted through tubes and hoses to the corresponding cylinder and the desired motion is performed. When the limit of this motion or stroke is reached (piston rod fully extended or retracted), pressure built up in the system to approximately 2000 psi forces a plunger in the relief valve section of the control valve to open and return excess oil to the reservoir. The tilt-lock valve prevents the flow of oil to and from the tilt cylinders when the hydraulic system is not pressurized, even though the control valve lever is depressed. This prevents tilting of the mast when the engine is not running.

63. Tilt-Lock Valve

a. Test.

(1) Tilt mast to far forward position.

(2) Install a 0- to 2000-psi gage in the line from the bottom of the valve to the rear of the tilt cylinders.

(3) With engine running at fast idle, operate the tilt cylinders until all air is bled from the system. Tilt the mast to far back position. Slowly push the tilt control lever forward. The mast must not move forward until the gage reads 550 psi. If the valve fails to meet this requirement, replace it.

b. Removal.

(1) Tilt the mast to far forward position.

(2) Place a drain pan under the tilt-lock valve (fig. 53). Disconnect the hydraulic lines at the valve.

(3) Remove the two bolts, nuts, lockwashers and spacers that secure the tilt-lock valve to the dash panel, remove the valve.

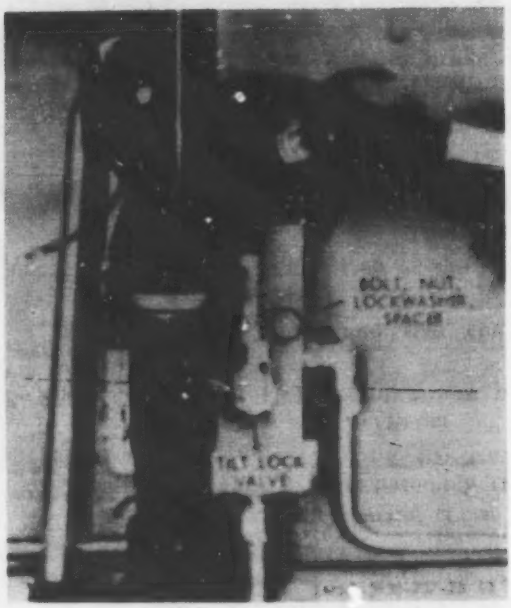


Figure 53. Tilt-lock valve.

c. Cleaning and Inspection.

(1) Clean the valve with a cloth dampened with an approved cleaning solvent.

(2) Inspect the valve body for cracks, evidence of leaks, or other damage.

(3) Inspect inlet and outlet ports for obstructions or damaged threads.

(4) Replace the valve if defective.

d. Installation. Install in reverse procedure of *a* above.

64. Lift and Tilt Control Lever Inspection

Inspect for missing cotter pins and washers; check handles and clevis pins for excessive wear and out-of-round condition.

65. Tilt Cylinder

a. Removal.

(1) Lower the carriage to the floor. Secure the mast to the overhead guard to pre-

vent the mast from tipping when hydraulic pressure is relieved.

(2) Remove the floor plate (para. 61*a*).

(3) Place a drain pan under the tilt cylinder (fig. 54). Disconnect the two hydraulic hoses from the tilt cylinder and allow the cylinder and hoses to drain.

(4) Support the weight of the cylinder. Remove the cotter pin and the pin that secures the piston rod end to the upright.

(5) Drive out the roll pin that secures the rear cylinder mounting pin to the cylinder mount. Remove the pin that secures the cylinders to the cylinder mount; remove the cylinder.

b. Installation.

(1) Position the cylinder (fig. 54) so that it engages the cylinder mount.

(2) Secure the rod end to the upright with the pin.

(3) Connect the hydraulic hoses to the tilt cylinder.

(4) With the engine at fast idle, operate the tilt lever until mast is tilted fully to the rear.

(5) Check degree of rear tilt; this should not exceed 10°. If degree of tilt is not 10°, reposition front rod end to obtain 10° back tilt.

(6) Visually check to see that both sides of mast move back and forth the same distance.

(7) Install cotter pin in front cylinder pin that secures cylinder to upright.

(8) Lubricate the tilt cylinder pins.

(9) Install the floor plates in reverse procedure of paragraph 61*a*(8).

66. Hydraulic Lift Chain

a. Removal.

(1) Lower the carriage so that it is resting on a level floor.

(2) Remove the cotter pins (fig. 55) and loosen the locknuts and adjusting nuts that secure the links at the upper end of the chains to the lift cylinder to provide slack in the chains.

Figure 54. Tilt cylinder installation.

(3) Remove the cotter pins and pins that secure the links at the lower ends of the chains to the carriage to release the lower ends of the chains.

(4) Remove the adjusting nuts and locknuts and remove the chains from the lift cylinder and from the rollers.

b. Cleaning and Inspection.

(1) Steam-clean the chains; blow dry with compressed air.

(2) Thoroughly lubricate the chains using the lubricant indicated in the lubrication order (fig. 3).

(3) Inspect the chains for cracked or damaged links, wear, and distortion. Replace damaged chains.

(4) Inspect the upper links for wear, distortion, and damaged threads; replace damaged links.

(5) Inspect the links at the lower end of the chains for cracks and for worn or damaged bushings; replace damaged links.

c. Installation. Install in reverse procedure of *a* above.

d. Adjustment.

(1) Lower the lift cylinder to its lower

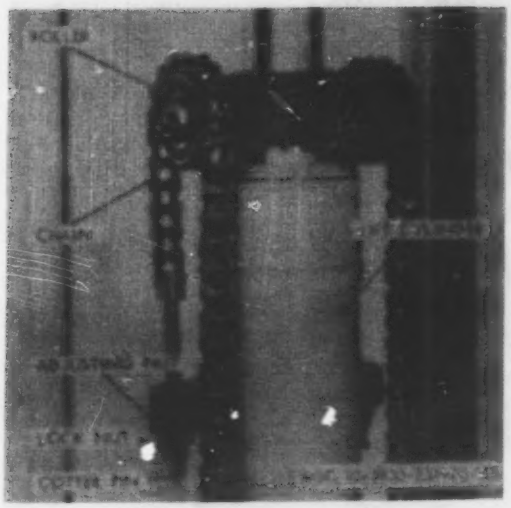


Figure 55. Hydraulic lift chain adjustment.

limit. Using the adjusting nut, tighten one chain until the center line of the lower carriage rollers is ½ inch above the bottom of the inner rail of the mast assembly. Tighten the remaining adjusting nut until the second chain is at the same tension as the first.

(2) With the carriage supporting a capacity load and lowered as far as it will go, check to see that the centerline of the lower carriage rollers are at least ½ inch above the bottom of the inner rail of the mast assembly and that the carriage is in a level position. If not, adjust the chains with the adjusting nuts.

(3) Lock the adjusting nuts with the locknuts. Install the cotter pins.

67. Hydraulic Oil Tank and Filter

a. Draining Tank.

(1) Lower the carriage until it is resting on the floor.

(2) Place a large container under the oil tank and remove the drain plug (fig. 56).

(3) Remove the hydraulic oil tank air cleaner; allow the tank to drain.

Caution: **Do not run the engine while the hydraulic oil tank is empty. Damage to the hydraulic pump could result.**

b. Disassembly.

(1) Disconnect the hydraulic hose from the hydraulic oil filter.

(2) Remove the bolts (6, fig. 57) and lockwashers (5) that secure the hydraulic oil filter to the tank; remove the assembled filter and gasket (1) from the tank.

(3) Remove the body (2) and gasket (3) from the cover (4).

(4) Remove the two nuts (14) and gaskets (13) that secure the check valve body (12) to the cover; remove the check valve body, gasket (11), ball (10), spring (9), element (8), and gasket (7).

c. Cleaning.

(1) Clean metal filter components with an approved cleaning solvent; dry with clean, dry compressed air. Clean the interior of the hydraulic tank with a

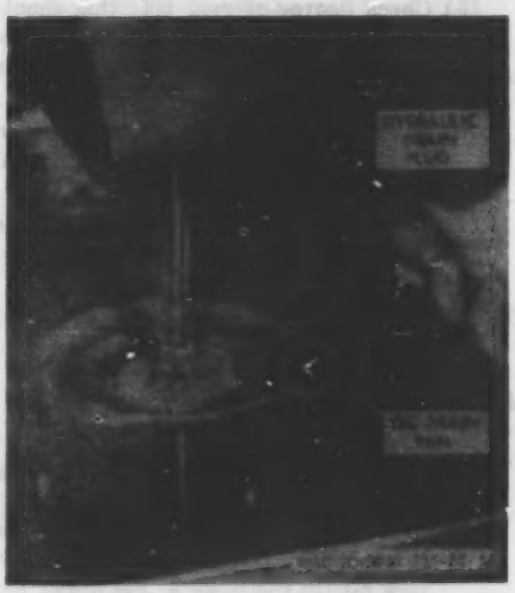
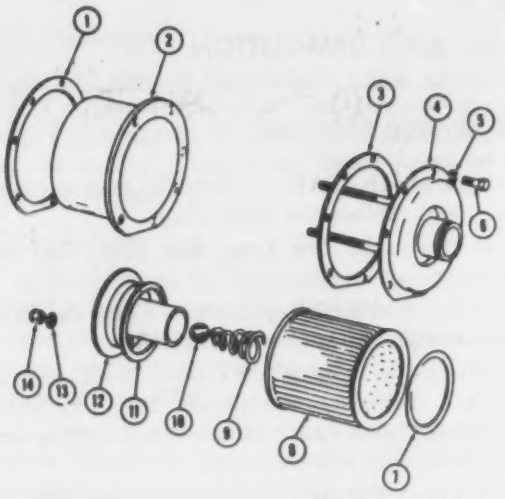


Figure 56. Draining hydraulic oil tank.



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1	Gasket	8	Element
2	Body	9	Spring
3	Gasket	10	Ball
4	Cover	11	Gasket
5	Lockwasher	12	Check valve body
6	Bolts	13	Gasket
7	Gasket	14	Nut

Figure 57. Hydraulic oil filter, exploded view.

clean cloth. Rinse with 2 quarts of hydraulic oil.

(2) Replace gaskets, filter element, and damaged or worn parts.

d. Installation. Install in reverse procedure of *b* above.

e. Refilling Hydraulic Tank. Fill the hydraulic tank to the bottom of the filler tube. With the engine at idle speed, raise and lower the carriage and operate the tilt cylinder. Refill the hydraulic tank. Check for leaks.

68. Hydraulic Tank Air Cleaner

a. Removal. Remove the hydraulic tank air cleaner (fig. 6) by unscrewing it from the hydraulic tank.

b. Cleaning. Clean the hydraulic tank air cleaner by tapping it on a woodblock or bench while rotating the air cleaner. This procedure is intended to dislodge particles caught in the air cleaner filter. Replace the filter after it has been in service for 500 operating hours.

c. Installation. Install in reverse procedure of *a* above.

CHAPTER 4
SHIPMENT, LIMITED STORAGE, AND DEMOLITION

Section I. SHIPMENT AND LIMITED STORAGE

69. General

This section gives procedures to be followed before the forklift truck is shipped or placed in storage. The purpose of these procedures is to prevent damage to the forklift truck during shipment or storage. The procedures covered include preliminary services, equipment preparation, storage instructions, and loading instructions.

70. Preliminary Services

a. Remove rust and loose paint; touch up areas having damaged paint surfaces.

b. Lubricate the forklift truck (para. 11).

c. Coat exposed portions of the tilt cylinder piston rods, lift cylinder piston rod, and steering cylinder piston rod with heavy grease.

d. Check the oil level in the hydraulic steering and lift systems. Add oil if necessary.

e. Check the state of the battery charge (para. 43). Charge the battery if necessary.

71. Equipment Preparation

For long-distance shipment of the forklift truck or for long-term storage, prepare the truck as follows:

a. With the engine at atmospheric temperature, drain oil from the engine crankcase. Fill the crankcase to about one-half capacity with SAE 50 oil. Operate the engine at idle speed for 2 minutes to distribute the heavy oil througout the engine.

Caution: **Do not operate the engine longer than 2 minutes with SAE 50 oil in the crankcase. Damage to the engine could result.**

b. Remove the spark plugs (para. 41). Pour 3 ounces of SAE 50 engine oil into each cylinder. Remove the lead from the center of the distributor and crank the engine at least 12 revolutions with the starter. Replace the spark plugs (para. 41) and distributor lead.

c. Drain the SAE oil from the engine crankcase and replace the drain plug.

d. Drain the fuel tank, fuel lines, and carburetor.

e. Drain the cooling system. Close the drain cocks after the system is drained.

f. Seal the engine air cleaner inlet, exhaust outlet, crankcase ventilation tube, hydraulic reservoir inlet, and transmission breather with weatherproof masking tape.

g. Check the oil filler cap, fuel tank cap, and radiator cap to be sure they are securely in place.

72. Storage Instructions

a. The storage operation protects the forklift truck from the elements and rapid temperature variations to the greatest extent possible. Store the forklift truck in a heated building, if possible. If heated storage is not available, use an unheated building. If an unheated building is not available, use a tarpaulin or whatever material is obtainable to provide the best protection possible.

b. Raise the forklift truck with jacks; block under the frame to support the weight of the vehicle. Store the forklift truck in a level position with the carriage resting on blocks.

73. Loading Instructions

a. The forklift truck may be lifted with a crane using the lifting points over each wheel marked "LIFT HERE" (fig. 2). The forklift truck may also be loaded from a dock or platform using suitable planking for a ramp.

b. After the forklift truck is in position on the transporting vehicle, set the handbrake, lower the carriage, and place chocks ahead and behind the front wheels. Secure the forklift truck with cables, tying them to the frame in front and the frame and counterweight in back.

Section II. DEMOLITION

74. Authority

Do not destroy the forklift truck except on order of proper authority, and demolish it only to prevent capture and use of the forklift truck by the enemy. Destroy the same parts on all similar equipment.

75. Methods

a. Demolition by Explosives. Demolish the forklift truck by placing explosive charges between the engine and generator, on the starting motor, on the transmission, and between the lift cylinder and mast.

b. Demolition by Misuse. Render the forklift truck useless by operating the engine without oil, or by disconnecting the governor and operating the engine at full throttle until failure occurs.

c. Demolition by Mechanical Methods. Use a sledge hammer, ax, or crowbar to smash the distributor, carburetor, radiator, starting motor, generator, hydraulic pumps, hydraulic cylinders, transmission, etc. Slash all hoses and tubes.

d. Demolition by Burning. Pack rags, newspapers, brush, or other materials around and under the engine, transmission, and tires. Saturate the materials with gasoline, diesel fuel, or other flammable fluids and ignite.

e. Demolition by Scatter and Concealment. Remove easily accessible parts such as the distributor rotor and cap, generator, ignition coil, voltage regulator, and linkages. Scatter them in dense foliage, cover them in sand, or throw them into streams, lakes, or other bodies of water.

APPENDIX I
REFERENCES

1. Army Regulations

AR 320–5	Dictionary of United States Army Terms
AR 320–50	Authorized Abbreviations and Brevity Codes
AR 600–55	Motor Vehicle Driver Selection, Testing, and Licensing
AR 750–5	Organization, Policies, and Responsibilities for Maintenance Operation

2. Department of the Army Pamphlets

DA Pam 108–1	Index of Army Motion Pictures, Film Strips, Slides, Tapes, and Phono-Recordings
DA Pam 310–1	Index of Administrative Publications
DA Pam 310–2	Index of Blank Forms
DA Pam 310–3	Index of Doctrinal, Training, and Organizational Publications
DA Pam 310–4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (type 4, 6, 7, 8, and 9), Supply Bulletins, Lubrication Orders, and Modification Work Orders
DA Pam 310–5	Index of Graphic Training Aids and Devices

3. Field Manuals

FM 5–25	Explosives and Demolition
FM 21–5	Military Training
FM 21–6	Techniques of Military Instructions
FM 21–30	Military Symbols

4. Technical Manuals

TM 21–300	Driver Selection and Training (Wheeled Vehicles)
TM 38–750	Army Equipment Record Procedures

APPENDIX II
MAINTENANCE ALLOCATION

Section I. INTRODUCTION

1. General

This appendix contains explanations of all maintenance and repair functions authorized the various levels of maintenance. Section II contains the maintenance allocation chart.

2. Maintenance

Maintenance is any action taken to keep material in a serviceable condition or to restore it to serviceability when it is unserviceable. Maintenance of materiel includes the following:

a. Service. To clean, preserve, and replenish fuel and lubricate.

b. Adjust. To regulate periodically to prevent malfunction.

c. Inspect. To verify serviceability and detect incipient electrical or mechanical failure by scrutiny.

d. Test. To verify serviceability and detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, and the like.

e. Replace. To substitute serviceable assemblies, subassemblies, and parts for unserviceable components.

f. Repair. To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes, but is not limited to, inspecting, cleaning, preserving, adjusting, replacing, welding, riveting, and straightening.

g. Aline. To adjust two or more components of an electrical system so that their functions are properly synchronized.

h. Calibrate. To determine, check, or rectify the graduation of an instrument, weapon, or weapons system, or components of a weapons system.

i. Overhaul. To restore an item to completely serviceable condition as prescribed by serviceability standards. This accomplished through employment of the technique of "Inspect and Repair Only as Necessary" (IROAN). Maximum utilization of diagnostic and test equipment is combined with minimum disassembly of the item during the overhaul process.

3. Explanation of Columns

a. Functional Group. The functional group is a numerical group set up on a functional basis. The applicable Functional Grouping Indexes (obtained from the United States Army Mobility Command) are listed on the MAC in the appropriate numerical sequence. These indexes are normally set up in accordance with their function and proximity to each other.

b. Components and Related Operation. This column contains the Functional Grouping Index heading, subgroup heading, and a brief description of the part starting with the noun name. It also designates the operations to be performed such as service, adjust, inspect, test, replace, repair, and overhaul.

c. Levels of Maintenance. This column contains the various levels of maintenance by letter designations:

O/C—Operator or Crew
O—Organizational
DS—Direct Support
GS—General Support
D—Depot

An X placed in the appropriate level of maintenance column in line with an indicated maintenance function authorized that level to perform the function. The X indicates the lowest level of maintenance responsible for performing the

function, but does not necessarily indicate repair parts stockage at that level. Higher levels of maintenance are authorized to perform the indicated functions of lower levels.

d. Remarks. This column lists specific maintenance functions, special tools, cross-references, instructions, and the like pertinent to the operation being performed.

Section II. MAINTENANCE ALLOCATION CHART

Functional Group	Components and Related Operation	Levels of Maintenance					Remarks
		O/C	O	DS	GS	D	
01	ENGINE						
0100	Engine assembly						
	Test	------	X	------	------	------	Compression, vacuum, timing.
	Replace	------	------	X			
	Overhaul	------	------	------	X		
0101	Block, engine						
	Inspect	------	------	------	X		
	Overhaul (rebore)	------	------	------	------	X	Reboring may be accomplished at 4th echelon if facilities are available from Government or commercial sources.
	Head, cylinder						
	Clean, inspect, replace	------	X				
	Repair	------	------	X			
0105	Valves, intake and exhaust						
	Adjust	------	X				
	Replace, repair	------	------	X			
0106	Filter, engine oil						
	Clean, replace	------	X				
0108	Manifold, intake and exhaust						
	Clean, inspect, replace	------	X				
03	FUEL						
0301	Carburetor						
	Adjust, replace	------	X				
	Repair	------	------	X			
0302	Pump, fuel						
	Clean, test, replace	------	X				
0304	Cleaner, air						
	Clean, replace	------	X				
0306	Tank, fuel						
	Clean	------	X				
	Repair	------	------	------	X		
0308	Governor						
	Adjust	------	X				
	Replace, repair	------	------	------	X		
0312	Pedal and linkage, accelerator						
	Adjust, replace	------	X				
04	EXHAUST						
0401	Muffler and pipes						
	Inspect, replace	------	X				
05	COOLING						
0501	Radiator						
	Clean, replace	------	X				
	Test, repair	------	------	------	X		
0502	Thermostat						
	Test, replace	------	X				

Section II. MAINTENANCE ALLOCATION CHART—Continued

Functional Group	Components and Related Operation	Levels of Maintenance					Remarks
		O/C	O	DS	GS	D	
0504	Water pump						
	Inspect, replace	------	X				
0505	Belts, fan and generator						
	Adjust, replace	------	X				
06	ELECTRICAL						
0601	Generator						
	Test, replace	------	X	------	------	------	Voltage output test.
	Test, repair	------	------	X			
0602	Regulator, voltage						
	Adjust, test, replace	------	X				
0603	Motor, starting						
	Replace	------	X				
	Test, repair	------	------	X			
0605	Distributor, ignition						
	Adjust, replace, repair	------	X				
	Spark plugs						
	Clean, adjust, test, replace	------	X				
0607	Gages and instruments						
	Inspect, replace	------	X				
0612	Battery and cables						
	Clean, test, replace	------	X				
07	TRANSMISSION						
0702	Transmission w/differential						
	Test, replace	------	------	X			
	Overhaul	------	------	------	X		
0703	Valve, transmission control						
	Test, replace, repair	------	------	X			
0705	Lever and linkage						
	Adjust	------	X				
	Replace	------	------	X			
0712	Filter, transmission oil						
	Clean, replace	------	X				
10	FRONT AXLE ASSEMBLY						
1000	Axle assembly, drive						
	Inspect, replace	------	------	X			
	Repair	------	------	------	X		
11	REAR AXLE						
1134	Axle assembly, steering						
	Replace, repair, adjust	------	------	X			
12	BRAKES						
1201	Lever, cables and linkage handbrake						
	Adjust, replace	------	X				
	Brakeshoe, handbrake						
	Adjust	------	X				
	Replace	------	------	X			
1202	Brakeshoes, service brake						
	Adjust, replace	------	X				
	Repair	------	------	X			
1204	Cylinder assembly, master						
	Replace	------	X				
	Repair	------	------	X			
	Cylinder assembly, wheel						
	Replace	------	X				
	Repair	------	------	X			

Section II. MAINTENANCE ALLOCATION CHART—Continued

Functional Group	Components and Related Operation	Levels of maintenance					Remarks
		O/C	O	DS	GS	D	
1206	Pedal and linkage, service brake and inching						
	Adjust	------	X				
	Replace	------	------	X			
13	WHEELS						
1311	Wheel and tire assemblies						
	Replace	------	X				
	Repair	------	------	------	X		
	Bearings, wheel						
	Clean, adjust, inspect, replace	------	X				
14	STEERING						
1401	Gear assembly, steering						
	Adjust, replace	------	------	X			
	Repair	------	------	------	X		
	Drag links						
	Adjust, replace, repair	------	X				
18	BODY						
1806	Cushions, seat and backrest						
	Replace	------	X				
	Repair	------	------	------	X		
24	HYDRAULIC LIFT						
2401	Pump assembly, hydraulic						
	Replace, repair, test	------	------	X			
2402	Valve assembly, hydraulic control						
	Replace, repair	------	------	X			
	Valve, tilt, lock						
	Test, replace	------	X				
	Repair	------	------	X			
2403	Levers and linkage, lift and tilt control						
	Inspect	------	X				
	Replace	------	------	X			
2404	Cylinder assembly, tilt						
	Adjust, replace	------	X				
	Repair	------	------	X			
2405	Cylinder assembly, lift						
	Replace, repair	------	------	X			
	Mast assembly						
	Replace, repair	------	------	X			
	Carriage assembly						
	Replace, repair	------	------	X			
	Chain, hydraulic lift						
	Clean, adjust, inspect, replace	------	X				
2406	Tank assembly, hydraulic oil						
	Clean	------	X				
	Cleaner, air, hydraulic oil tank						
	Clean, replace	------	X				
	Filter, hydraulic oil						
	Clean, replace	------	X				

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NG: State AG (3).

USAR: None.

For explanation of abrreviations used, see AR 320-50.

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